CORNELL UNIVERSITY

OFFICIAL PUBLICATION

MARCH 24, 1951

Graduate School

ANNOUNCEMENT

FOR 1951-52 SESSIONS

CALENDAR

1951 FALL TERM

Sept. 7	Last day for completing all requirements (including payment of graduation fees) for September degrees.
Sept. 17–18	Registration.
Sept. 19	Instruction begins at 1 P.M.
Oct. 2	Last day for filing statement-of-courses blank and change-of-committee blank and for new students to file candidacy blanks to receive residence credit for the term.
Oct. 9	Last day for payment of tuition for the term.
Oct. 20	Last day for taking qualifying and language examinations in order to have them considered as of the beginning of the term.
Nov. 21–25	Instruction ends at 12:50 P.M., Nov. 21. Thanksgiving recess.
Dec. 19	Instruction ends at 10:00 P.M. Christmas recess.

1952

Jan. 3	Instruction resumes at 8 A.M.
Jan. 18	Last day for completing all requirements (including payment of graduation fees) for February degrees.
Jan. 30	Term ends.

SPRING TERM

Feb. 1–2	Registration.
Feb. 4	Instruction begins at 8 A.M.
Feb. 16	Last day for filing statement-of-courses blank and change-of-committee blank and for new students to file candidacy blanks to receive residence credit for the term.
Feb. 25	Last day for payment of tuition for the term.
March 1	Last day for filing applications for scholarships and fellowships for 1952–53.
March 1	Last day for taking qualifying and language examinations in order to have them considered as of the beginning of the term.
March 22	Instruction ends at 12:50 P.M. Spring recess.
March 31	Instruction resumes at 8:00 A.M.
May 23	Last day for completing all requirements (including payment of graduation fees) for June degrees.
June 3	Term ends.
June 9	Commencement.

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ADMINISTRATION

THEODORE P. WRIGHT, D.Sc., Acting President of the University and Vice President for Research.

CHARLES WILLIAMS JONES, Ph.D., Dean of the Graduate School.

DAMON BOYNTON, Ph.D., Secretary of the Faculty.

GENERAL COMMITTEE

Professor M. S. KENDRICK, *at large, term expires* 1951.

Professor S. A. ASDELL, *at large,* 1952.

Professor H. H. WILLIAMS, *at large,* 1953.

Professor L. P. SMITH, *at large,* 1953.

Professor H. A. WICHELNS, Group A *(Languages and Literatures),* 1951.

Professor HENRY GUERLAC, Group B *(History, Political Science, Philosophy, Psychology, Agricultural Economics, Farm Management, Rural Sociology),* 1953.

Professor W. T. MILLER, Group C *(Mathematics, Astronomy, Physics, Chemistry, Geology, Geography, Geodesy),* 1953.

Professor G. C. KENT, Group D *(Biological Sciences),* 1953.

Professor C. O. MACKEY, Group E *(Engineering, Architecture, Rural Engineering, Landscape Design),* 1951.

Professor C. V. MORRILL, Group F *(Preclinical Departments of the Cornell University Medical College in New York City),* 1952.

Professor J. H. BRUCKNER, Group G *(Agricultural Sciences),* 1952.

Professor B. F. WILLCOX, Group H *(Law),* 1953.

Professor A. L. WINSOR, Group I *(Education),* 1951.

Professor J. M. MCCONNELL, Group J *(Division of Industrial and Labor Relations),* 1952.

THE SECRETARY OF THE FACULTY, *ex officio.*

THE DEAN, *Chairman ex officio.*

The office of the Graduate School is in the Administration Building, Room 125. The office hours are 8:30 A.M. to 12:00 M.; 1:00 P.M. to 4:00 P.M.

GENERAL INFORMATION

It is the purpose of the Graduate School to offer facilities for advanced study and research, to the end that adequately trained students may receive a comprehensive view of a field of knowledge and the training required for independent investigation in that field. The Faculty requires a high grade of scholarly work rather than the fulfillment of routine requirements.

The following degrees are offered:

Master of Arts (M.A.)
Master of Science (M.S.)
Master of Science in Agriculture (M.S. in Agr.)[1]
Master of Fine Arts (M.F.A.)[2]
Master of Architecture (M.Arch.)[2]
Master of Landscape Architecture (M.L.A.)[2]
Master of Regional Planning (M.R.P.)[2]
Master of Metallurgical Engineering (M.Met.E.)[3]
Master of Chemical Engineering (M.Chem.E.)[3]
Master of Civil Engineering (M.C.E.)[3]
Master of Electrical Engineering (M.E.E.)[3]
Master of Engineering Physics (M.E.P.)[3]
Master of Mechanical Engineering (M.M.E.)[3]
Master of Education (M.Ed.)[4]
Master of Science in Education (M.S. in Ed.)[4]
Master of Science in Industrial and Labor Relations (M.S. in I.L.R.)[5]
Master of Laws (LL.M.)[6]
Doctor of the Science of Law (J.S.D.)[6]
Doctor of Education (Ed.D.)
Doctor of Philosophy (Ph.D.)

[1]Open only to students who have had a four-year course in Agriculture or the equivalent.

[2]Under the special jurisdiction of the Division of Architecture and Fine Arts.

[3]Under the special jurisdiction of the Division of Engineering.

[4]Under the special jurisdiction of the School of Education.

[5]Under the special jurisdiction of the Division of Industrial and Labor Relations.

[6]Under the special jurisdiction of the Division of Law.

ADMISSION

To be admitted to the Graduate School an applicant (1) must hold a baccalaureate degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree; (2) as judged by his previous scholastic record, or otherwise, must show promise of ability satisfactorily to pursue advanced study and research; and (3) must have had adequate preparation to enter upon graduate study in the field chosen.

Inquiries about admission should be addressed to *The Graduate School, Cornell University, Ithaca, New York.*

An application for admission should be made on the proper form, which will be supplied at the office of the Graduate School. No application will be acted upon until all the credentials enumerated in this form have been filed.

In addition to presenting these credentials, any applicant residing in the United States is required to take the Graduate Record Examination Aptitude Test and to have the scores forwarded to the office of the Graduate School if he is applying for major work in one of the following fields: Conservation (Aptitude *and* Profile Tests), English Language and Literature, Geology and Geography, History (Aptitude *and* Profile Tests), Zoology. If for satisfactory reasons it is not feasible for an applicant in these fields to take the examination before his application is considered, the Admissions Committee may act provisionally, pending submission of scores at a later date.

Although the test is not required in other fields, the Admissions Committee welcomes submission of any Graduate Record Examination test scores as additional helpful data which it will consider in acting upon an application.

The Graduate Record Examination is administered four times each year throughout the United States and Canada. It does not require any special preparation and may be taken upon application and the payment of moderate fees. Inquiries about the examination and applications for taking it should be addressed to the Educational Testing Service, P.O. Box 592, 20 Nassau St., Princeton, N.J.

For admission in the fall term, file application before March 1; for the Summer Session between March 15 and May 1. Though applications may be filed at any time, the officers cannot give assurance that the application will receive the same consideration that it would receive if filed during those periods.

An applicant is admitted to the Graduate School in one of the following categories: (1) a candidate for a degree; (2) a noncandidate; (3) a resident doctor; (4) an honorary fellow.

Candidates. Students admitted to the Graduate School usually pursue a course leading to one of the advanced degrees. The work of a candidate for a degree is directed by a Special Committee selected by the student.

Professors, associate professors, assistant professors, instructors who hold the Doctor's degree, and such other members of the teaching or research staff of the University as the Faculty may authorize are eligible for membership on the Special Committees which supervise the work of graduate students.

A candidate for an advanced professional degree given under the jurisdiction of some division of the Graduate School should examine the special requirements for the degree as printed on pp. 44–47, 129–130, 136–139, 172, or 178–179.

Noncandidates. A noncandidate is expected to pursue a coordinated program of graduate work approved by his adviser. The student selects his adviser from members of the Faculty of the Graduate School and must file with the Dean within two weeks of first registration a statement of the field in which he wishes to work, together with the adviser's signature indicating assent.

Students who register as noncandidates and who afterward wish to become candidates may so change their registration and obtain credit for work already done only if they were able to meet the language requirements at the time of their first registration. One term of residence credit may be transferred from noncandidacy to fulfillment of requirements in candidacy upon recommendation of the candidate's Special Committee.

Resident Doctors. Persons who hold the Doctor's degree or who have equivalent standing may, with permission from the Dean, be admitted to the Graduate School as Resident Doctors, for the purpose of engaging in advanced study and research in a field in which they have had adequate preparation. On the recommendation of the Dean, Resident Doctors are exempt from the payment of tuition and all fees except laboratory charges. Ordinarily they are not permitted to attend classes.

Honorary Fellows. Holders of the Doctor's degree or other persons of recognized standing as scholars, who wish to continue work in a

field in which they have already achieved distinction, may, in the discretion of the Faculty, be appointed to honorary fellowships. These fellowships cover all fees except the laboratory and library fee. Actual residence at the University and regular registration in the Graduate School are required of incumbents.

REGISTRATION

The rules of the University provide: "All students taking work in the Graduate School or work leading to, or in contemplation of, an advanced degree, shall, at the beginning of each term or session, register both in the Graduate School and with the Registrar of the University." This registration takes place in Barton Hall on registration day at the hour appointed by the Registrar. Registration must be made in person, not by proxy. A fee of $5 is required for late registration by matriculated students.

Candidates for advanced degrees granted under special jurisdiction (see p. 7) shall register also with the division concerned.

A graduate student who has completed the requirements of residence for his degree and who remains in residence while working on his thesis or while doing other work in contemplation of a degree must register each term in which he is thus engaged.

A graduate student who returns to the University to present his thesis and to take the final examination for an advanced degree, all other work for that degree having been previously completed, shall register as a "candidate for degree only" and shall pay only an administration fee of $20.00.

A graduate student who discontinues his work for any reason during a term in which he is registered should immediately report this fact at the office of the Graduate School in order to obtain an official withdrawal or an honorable dismissal.

Registration of Courses. At the beginning of each term a candidate shall make out in triplicate a list of all the courses and other work which he plans to take during the term and shall have this list signed by the chairman of his Committee as an indication of approval. The research or essay writing required by the Special Committee for candidates for the Master's degree under Plan B should be entered with semester-hour equivalents. The three copies must be filed in the office of the Graduate School within two weeks after registration. Any subsequent change in this list of courses must be recorded on forms to be obtained at the office. This registration and any subse-

quent changes are official parts of University registration and are also subject to the late-registration fee.

Grades. Grade reports are made available each term to all students. Information concerning grade reports is published by the Registrar's office. Formal transcripts of Cornell records are issued from the Registrar's office, and all requests for transcripts should be made to that office.

RESIDENCE CREDIT

All advanced degrees require a minimum period of residence at the University, calculated as residence credit according to the following regulations:

1. One term of residence credit is predicated upon one academic term of full-time work satisfactorily completed.

2. If in any term a candidate's work is unsatisfactory in either the major or a minor subject, he may not receive the full residence credit for which he is otherwise eligible, and the amount he may receive will be determined by his Special Committee.

3. Candidates holding appointments in the University as instructors, assistants, teaching fellows, teaching assistants, or research assistants will be eligible for residence credit in accordance with the following formula:

(a) A maximum of one term of residence credit if appointment requires not more than six clock-hours a week.

(b) A maximum of three-fourths of a term of residence credit if appointment requires more than six but not more than twenty clock-hours a week.

(c) A maximum of five-eighths of a term of residence credit, if appointment requires more than twenty but not more than twenty-five clock-hours a week.

(d) A maximum of one-half term of residence credit if appointment requires more than twenty-five but not more than thirty clock-hours a week.

4. A candidate engaged in nonacademic work, or part-time academic work not indicated above, which in the judgment of his Special Committee interferes with his academic program will be eligible for only partial residence, as determined by his Special Committee within the provisions of the preceding formula. Those who have

contracted for "full-time" employment are eligible for a maximum of two-fifths residence credit.

5. Students registered for a normal program of study at the graduate level in the Summer Session are eligible to receive residence credit providing the study is properly a part of the program for the degree for which they are candidates. Such residence may be counted at the rate of three summer sessions for one term of credit and five sessions for two terms. To obtain such credit the candidate must register both in the Summer Session and in the Graduate School (subject to the exception stated on p. 13).

6. Extramural Students:

(a) A candidate registered extramurally for *fewer than six* semester-hours a term in courses given on the campus during the regular academic year may accumulate residence credit by such work, on recommendation of his Special Committee, up to a maximum of one term (or three summer sessions). For such work in the amount of *six or more* semester-hours a term, maximum residence credit will be allowed as for work done in the Summer Session.

(b) A candidate registered extramurally in courses given at off-campus centers authorized by the University may accumulate residence credit, on recommendation of his Special Committee, up to a maximum of two summer sessions.

(c) Residence credit earned by extramural work will be recorded only in blocks of six semester-hours, each such block being regarded as the equivalent of one summer session of residence credit.

7. A candidate for an advanced degree is expected to complete his residence with reasonable continuity. Under any circumstances, a candidate who fails to register during a period of four or more years before he has completed minimum residence requirements loses such residence credit as he has acquired. The General Committee, on petition endorsed by the Special Committee, may restore a fraction of the lost credit. The Committee will be guided in its decision by a written estimate made by the candidate's Special Committee of the period of study needed by the candidate to recover ground lost. All work for an advanced degree, including the final examination, must be completed within four years after the minimum residence requirement for the degree has been satisfied.

REQUIREMENTS FOR THE MASTERS' DEGREES

RESIDENCE REQUIREMENTS . . .

The minimum residence requirement for a Master's degree is two full terms.

Before he may be awarded any degree conferred by Cornell University, a student must have spent at least one full academic year, or the equivalent, in residence at the University and in study for that degree. In consequence, graduate work done elsewhere cannot be counted to reduce the residence requirement for a Master's degree below one year.

To receive credit for residence a candidate must be regularly enrolled in the Graduate School. However, a student who before matriculation successfully completed a course of study at the graduate level in one Summer Session at Cornell may petition for transfer of this work, on approval of his Special Committee, after he has matriculated in the Graduate School.

The satisfactory completion of the candidate's work, term by term, must be attested by the members of his Special Committee.

Work under Personal Direction. A candidate who lacks not more than one-half of a term's residence credit for completion of the residence requirement may, on recommendation of his Special Committee and with approval of the Dean, be permitted to register under Personal Direction for completion of the requirement during the summer. Application for permission must be made at least one week *in advance* at the office of the Graduate School, and the student must register with the Registrar and the Graduate School on the day the study begins. Satisfactory completion of the work must be certified by the supervising professor. There is no course credit for work under Personal Direction.

A candidate registered under Personal Direction during the summer may be admitted to the classes of the six-week Summer Session. Candidates must register both in the Summer Session and in the Graduate School and must pay tuition at least equal to that required for the Summer Session.

Additional Requirements of Residence for Deficiency in Foreign Language. Candidates for the degree of M.A., M.S., M.Arch., M.L.A., M.F.A., or M.R.P. are subject to the following special requirements

in foreign language, which may affect the amount of residence required of them.

(a) A candidate must have had training in a foreign language equivalent to three college entrance units, or in two foreign languages equivalent to two college entrance units in each; or

(b) if he lacks such training he must, at the beginning of his candidacy (i.e., within one month after registration), prove his ability to read either French or German (or another language other than English approved by his Special Committee) by passing an examination given by a member of the Language Examination Board. The student must be enrolled in the Graduate School at the time such an examination is taken.

(c) An applicant who, at entrance, cannot meet either of the requirements (a) or (b), but who is otherwise qualified for admission, may be admitted to candidacy subject (1) to presenting three terms of residence (instead of two) for graduation, and (2) to demonstrating, before a member of the Language Examination Board not later than the beginning of the last term of residence, a reading knowledge of a foreign language as provided above. The General Committee of the Graduate School, upon the recommendation of the Student's Special Committee, may waive the requirement of an extra term of residence, provided preparation in foreign language is made during a period when the student is not receiving residence credit

REQUIREMENTS IN COURSE . . . Two plans of procedure are offered to candidates for Masters' degrees; they are described below as Plan A and Plan B.

PLAN A

Open to candidates for M.A., M.S., M.S. in Agr., M.F.A., M.Arch., M.L.A., M.R.P., M.Chem.E., M.C.E., M.Met.E., M.E.E., M.M.E., or M.E.P.

Plan A is intended for those candidates who wish to acquire competence in a restricted field of work.

The candidate works under the direction of a Special Committee, usually of two Faculty members, representing a major and a minor subject. He is required to present a thesis or an essay acceptable to his Committee and to pass a final examination.

Major and Minor Subjects. A list of approved major and minor subjects will be found below in the course announcement of each

field of instruction. Before selecting his major and minor subjects the student should consult members of the Faculty regarding suitable combinations of subjects. The candidate will devote the major portion of his time to his major subject and the remainder to his minor subject, the exact division being determined by his Committee. The requirements may consist of work in formal courses, informal work in seminars, or assigned reading or study and research in the discretion of the Special Committee. There are no requirements in semester-hours under Plan A.

Special Committee. After the candidate has chosen his major and minor subjects, he must select one member of the Faculty in residence at Ithaca or at the Medical College in New York City to represent each subject and to serve as his Special Committee. The representative of the major subject shall be chairman. In special cases two Faculty members may be chosen to represent either the major or the minor subject. If there are two representatives of the major subject, one, resident at Ithaca or at the Medical College in New York City, shall be designated as chairman.[1] Not later than two weeks after his first registration in the Graduate School a candidate must file, on the proper blank, a statement of the major and minor subjects which he has selected. This statement must be signed by each member of the Special Committee as an indication of his approval and consent to serve on the Committee.

A candidate may change the membership of his Special Committee with the approval of all the members of the newly constituted Committee. Notice of such change must be filed immediately with the Dean of the Graduate School. A vacancy on a Special Committee, caused by the absence of a member from the University, may be filled by the Dean on joint recommendation of the candidate and the members concerned.

Thesis or Essay. A candidate for any of the Masters' degrees under Plan A must complete an acceptable thesis, or, in the discretion of his Special Committee, an essay. The thesis, or essay, is ordinarily written in the candidate's major field and under the direction of the chairman of his Special Committee. It must be approved, however, by all members of the Committee. For this purpose it should be in the Committee's hands at least fifteen days before the final

[1]A representative of the major subject resident at Geneva may be designated cochairman with a representative of the major subject resident at Ithaca.

examination; and during the five days immediately preceding this examination a typewritten copy, with approval slip signed by all members of the Special Committee, must be on file in the office of the Graduate School. On the approval slip the name of the student (as it appears on the records in the Graduate School) and the title of the thesis must be identical with those on the title page of the thesis as indicated in the form below. Under no circumstances may the final examination be given before the thesis has been accepted and filed.

The thesis must be typewritten, double-spaced, on a durable rag bond, 8 by 10½ inches, with a left-hand margin of at least an inch and a quarter. The carbon copy need not be on bond paper. The ozalid process may be used provided the paper is bond of at least 50-per-cent rag content. *The title page must be typed.* The title page should be set up according to the following form:

[TITLE OF THESIS]

A Thesis

Presented to the Faculty of the Graduate School of Cornell University for the Degree of

[ ]

By

[Author's name in full]

[Month and year in which degree is to be conferred]

Immediately following the title page there must be a biographical sketch of the author, in length not exceeding 150 words.

Before the degree can be conferred two[2] bound, typewritten copies (one of which must be a ribbon copy) of the completed thesis, approved by the Special Committee, must be deposited in the office of the Graduate School. These copies become the property of the University Library.

When the major subject for the degree of Master of Architecture or the degree of Master of Landscape Architecture is in Design, the candidate is required to deposit, in place of the thesis, either his original drawings or a photographic reproduction of them.

[2]The candidate should consult the chairman of his Committee to ascertain if additional copies are required by the department.

Final Examination. After the thesis, or essay, has been completed and filed in the office of the Graduate School, as provided above, and after the required period of residence has been substantially completed, the candidate is required to present himself for the final examination. No candidate may proceed to the final examination until the other requirements for his degree have been completed, except that the final examination may be given near the end of the candidate's last term of residence. The examination covers the thesis and the major and minor subjects. It may be written or oral, or both, at the option of the Special Committee.

An application for final examination, approved by the Special Committee, must be filed in the office of the Graduate School at least five days in advance of the examination.

Final examinations are conducted by the candidate's Special Committee and are open to all members of the Faculty. At the discretion of the Special Committee, those under whom the candidate has worked may be invited to participate in the examination. But the Special Committee alone shall decide upon the merits of the candidate's performance.

A report on the final examination, whether passed or failed, shall be filed by the Special Committee in the office of the Dean. By permission of his Special Committee, a candidate who has failed in a final examination may present himself for one re-examination but only within a period of from three to six months after the failure.

Plan B

Open to candidates for M.A., M.S., or M.S. in Agr.

Plan B is designed for those who wish a somewhat broader training than is permitted under Plan A. It is intended to meet the needs of prospective or in-service teachers in secondary schools and of others who wish to supplement a four-year college course by an additional year of study at the graduate level. The candidate, working under the direction of a Special Committee, is required (1) to complete satisfactorily a minimum of thirty semester-hours of work, comprising (a) work in formal courses and in seminars, including such examinations as may be given therein, and (b) either an acceptable expository or critical essay or problem in research; and (2) to pass a final comprehensive examination.

Fields of Concentration. Of the thirty semester-hours in formal courses, seminars, and the like required of a candidate working

under Plan B, approximately one-half must be in a field of concentration chosen by the candidate; and the remainder may be distributed in that field and in related fields, in the discretion of the candidate's Special Committee, as best meets his needs. Fields of concentration are broader than major and minor subjects specified under Plan A.

The following partial list of titles indicates the scope: American Culture, Agricultural Arts, Botanical Science, Education, Foreign Languages, General Science, History and Criticism of Art, Labor and Industry, Literature, Physical and Mathematical Sciences, Social Studies, Technical Agriculture, Zoological Science. This list is merely descriptive, and it is not the intention of the Faculty to confine selection to the fields named. The candidate will chose a title for his field of concentration in consultation with his Special Committee; that title is subject to the approval of the Dean.

Special Committees. The candidate must select two members of the Faculty resident at Ithaca to serve as his Special Committee. One of these, who is chairman of the Committee, must represent the field of concentration, the other may be chosen from either that field or some related field, depending on the candidate's program. The committee members' consent to serve, together with a statement of the field of concentration approved by both members of the Committee, must be filed with the Dean of the Graduate School, on the proper blank, not later than two weeks after first registration.

A candidate may change the membership of his Special Committee with the approval of both members of the newly constituted Committee. Notice of such change must be filed immediately with the Dean of the Graduate School. A vacancy on a Special Committee, caused by the absence of a member from the University, may be filled by the Dean on joint recommendation of the candidate and the members concerned.

Research or Essay. A substantial part of the candidate's work in the field of concentration shall be devoted to studies requiring investigation, organization of material, and criticism. Whether the candidate is to meet this requirement by work in seminars, by writing an essay, or in some other way is left to the Special Committee in consultation with the candidate. The completed essay or report of research must be submitted to the members of the Special Committee but not to the office of the Graduate School.

Final Examination. After the candidate has substantially satisfied the minimum period of residence and has satisfactorily completed at least thirty semester-hours of work approved by his Special Committee, he must present himself for the final comprehensive examination. No candidate may proceed to the final examination until the other requirements for his degree have been completed, except that the final examination may be given near the end of the candidate's last term of residence while he is still taking courses required for the degree. Eligibility for the final examination depends on satisfactory progress in those courses, and their completion is essential to meeting all requirements. The examination covers the research or essay as well as work done in formal courses and seminars. The examination may be written or oral, or both, at the option of the Special Committee.

An application for final examination, approved by the Special Committee, must be filed in the office of the Graduate School at least five days in advance of the final examination.

Final examinations are conducted by the candidate's Special Committee and are open to all members of the Faculty. At the discretion of the Special Committee, those under whom the candidate has worked may be invited to participate in the examination. But the Special Committee alone shall decide upon the merits of the candidate's performance.

A report on each final examination, whether passed or failed, shall be filed by the Special Committee in the office of the Dean. By permission of his Special Committee, a candidate who has failed in a final examination may present himself for one re-examination but only within a period of three to six months after the failure.

SPECIAL REQUIREMENTS FOR PROFESSIONAL DEGREES . . .

Additional requirements for professional degrees under special jurisdiction of divisions of the Graduate School will be found below in the course announcements of the divisions concerned, as follows:

Master of Fine Arts (M.F.A.), Master of Architecture (M.Arch.), Master of Landscape Architecture (M.L.A.), Master of Regional Planning (M.R.P.)—in the Division of Architecture and Fine Arts, pp. 44–47.

Master of Metallurgical Engineering (M.Met.E.), Master of Chemical Engineering (M.Chem.E.), Master of Civil Engineering (M.C.E.),

Master of Electrical Engineering (M.E.E.), Master of Engineering Physics (M.E.P.), Master of Mechanical Engineering (M.M.E.)—in the Division of Engineering, pp. 136–139.

Master of Education (M.Ed.), Master of Science in Education (M.S. in Ed.)—in the Division of Education, pp. 129–130.

Master of Laws (LL.M.)—in the Division of Law, pp. 178–179.

Master of Science in Industrial and Labor Relations—in the Division of Industrial and Labor Relations, pp. 172–176.

REQUIREMENTS FOR THE DEGREE OF PH.D.

Work leading to the degree of Doctor of Philosophy is designed to give the candidate a thoroughly comprehensive view of a field of knowledge and to train him in methods of research and scholarship in that field. A candidate is expected to maintain a high grade of achievement and to show evidence of ability in independent investigation and study. The requirements for the degree include (1) a minimum of six terms of residence as a graduate student; (2) the satisfactory completion, under the direction of a Special Committee, of work in one major subject and two minor subjects; (3) certain requirements in foreign language; (4) the presentation of an acceptable thesis and an abstract of the thesis; and (5) the passing of a qualifying examination and a final examination.

RESIDENCE REQUIREMENTS . . . For the degree of Ph.D. a minimum of six terms of residence is required; or seven terms if the candidate does not pass one of the examinations in foreign language (see "Requirements in Foreign Languages," p. 22) on beginning candidacy at Cornell University.

To receive credit for residence a candidate must be regularly enrolled in the Graduate School. The satisfactory completion of his work, term by term, must be attested by the members of his Special Committee.

No candidate may earn more than two terms of residence credit in any twelve-month period except with the permission of the Dean in special cases.

At least two of the last four terms must be spent in consecutive regular terms (other than the six-week Summer Session) at Cornell University.

Residence Credit for a Master's Degree. Residence credit earned as a candidate for a Master's degree, either at Cornell or elsewhere, may be credited toward the doctorate. Normally not more than two

terms of credit may be gained in this way, and the transfer requires the recommendation of the Special Committee.

Credit for Work in Other Universities. Upon the recommendation of the candidate's Special Committee residence up to a maximum of two terms may be credited toward the doctorate for work done in other graduate schools. On approval by the Dean, three terms may be allowed. In exceptional cases four terms may be granted by action of the General Committee. Application for such credit should be made by the student as soon as possible after registration and not later than the end of the first term of residence at Cornell. No residence may be allowed for study in an undergraduate college, including study as a Special Student in a college of Cornell University.

Residence in Summer Session. Residence credit toward the doctorate earned in summer sessions or extramurally at Cornell or elsewhere is ordinarily limited to two terms. A candidate who has already earned two terms of credit by work in summer sessions and who has demonstrated ability in graduate work may, however, upon recommendation of his Special Committee and with the approval of the General Committee, earn one more term of credit by work in the Summer Session at Cornell, with the privilege of credit for an additional term for research under personal direction.

Research under Personal Direction. A candidate who has demonstrated ability in graduate studies may, upon recommendation of his Special Committee and with the approval of the Dean, receive residence credit for research done during the summer under the personal direction of a member of the Faculty of the Graduate School. The privilege of working under Personal Direction will not ordinarily be granted to a student until he has completed at least one year of graduate work in regular terms at Cornell University (other than the six-week Summer Session). Application for permission must be made on regular forms at least one week *in advance* at the office of the Graduate School, and the student must register with the Registrar and the Graduate School on the day the study begins. The supervising professor must certify to satisfactory completion of the work. A maximum of two terms may be earned in this way.

A candidate registered under Personal Direction during the summer may be admitted to the classes of the six-week Summer Session. Candidates must register both in the Summer Session and in the

Graduate School and must pay tuition at least equal to that required for the Summer Session.

Work in Absentia. The candidate may be credited with residence for work done away from the University, provided such an arrangement offers superior advantages for the prosecution of the candidate's program. Work *in absentia* is subject to the following conditions:

(a) An applicant for this privilege must be regularly registered in the Graduate School as a candidate for the doctorate, and while not in residence shall receive no compensation except from the University and except from the Cornell Aeronautical Laboratory at Buffalo, N.Y., such allowable compensation being in the form of a research assistantship or its equivalent.

(b) He shall have spent at least two terms in Cornell University in study toward the Doctor's degree.

(c) Permission to count such times as residence may be given by the Dean of the Graduate School for a period not to exceed one term, when the application is unanimously approved by the members of the applicant's Special Committee. When a longer period of outside study is required, application for an extension of time should be made to the General Committee, which may, at its discretion, extend the period to two terms. In no event, however, shall a candidate acquire a total of more than two terms' residence under these provisions.

(d) A candidate who avails himself of this privilege shall continue to work under the general direction of his Special Committee. Whenever possible, however, the work should be carried on under the immediate supervision of a competent director, acting for the Special Committee and to be designated by that Committee.

(e) Reports regarding the progress of the work shall be made as directed by the Special Committee at intervals not in excess of one month.

REQUIREMENTS IN FOREIGN LANGUAGES . . . The candidate whose native language is English must demonstrate while in residence his ability to read both French and German (or two languages, other than English, approved by his Special Committee), by passing in each of these languages an examination given by a member of the Language Examination Board.[1] The two languages so approved shall be significantly useful in the candidate's field of work and not chosen solely with reference to the preparation of the thesis.

On recommendation of the Special Committee, English may be presented as a foreign language by a candidate whose native language is other than English. The examination will test the candi-

[1]Such examinations are given only on assignment by the Dean of the Graduate School to the appropriate examiner in the field which includes the candidate's major subject.

date's knowledge of the spoken as well as the written language, and the candidate's native language may not be presented as the second language. This examination will be given by the chairman of the candidate's Special Committee.

The examination in at least one foreign language must be passed immediately upon admission to candidacy; otherwise, a minimum of seven terms of residence credit is required. The extra term of residence may be waived by the General Committee of the Graduate School upon recommendation of the student's Special Committee if preparation in foreign language is made during a period when the candidate is not receiving residence credit.

The second language examination should be taken as soon as possible after admission to candidacy. Until it is passed no residence credit will be allowed after four terms of credit have been earned.

Language examinations passed within one month after registration are considered as being passed at the time of registration.

MAJOR AND MINOR SUBJECTS . . . The candidate must select a major subject and two minor subjects properly related to the major subject. He will devote more time to the major subject than to either minor subject, but the division of his time is left to the Special Committee. A list of approved major and minor subjects will be found below in the course announcement of each field of instruction. The candidate should consult members of the Faculty regarding his choice of subjects. Work in major and minor subjects consists of work in formal courses, informal work in seminars, assigned reading and independent study, in the discretion of the Special Committee. There are no requirements in semester hours for the degree of Ph.D.

Special Committee. After the candidate has chosen his major and minor subjects, he must select one member of the Faculty in residence at Ithaca or at the Medical College in New York City to represent each subject and to serve as his Special Committee. The representative of the major subject shall be chairman. In special cases two Faculty members may be chosen to represent either the major or minor subjects. If there are two representatives of the major subject, one, resident at Ithaca or at the Medical College in New York City, shall be designated as chairman.[2] Not later than two weeks

[2]A representative of the major subject resident at Geneva may be designated cochairman with a representative of the major subject resident at Ithaca.

after his first registration in the Graduate School a candidate must file, on the proper blank, a statement of the major and minor subjects which he has selected. This statement must be signed by each member of the Special Committee as an indication of his approval and consent to serve on the Committee.

A student may change the membership of his Special Committee with the approval of all the members of the newly constituted Committee. Notice of such change must be filed immediately with the Dean of the Graduate School. No such change in his Special Committee may be made after the fourth term of residence except with the approval of the Dean. A vacancy on a Special Committee, caused by the absence of a member from the University, may be filled by the Dean on joint recommendation of the candidate and the members concerned.

THESIS . . . The candidate is required to present a thesis. Ordinarily the thesis is written in the candidate's major field and under the direction of the chairman of his Special Committee. But with the approval of the representatives of the major and minor subjects the candidate may elect to write the thesis under the direction of another member of the Faculty, who then becomes a member of the Special Committee.

The thesis must be approved by all members of the Special Committee and must be acceptable in both scholarship and literary quality. The completed thesis should be in the hands of the Special Committee at least fifteen days before the final examination (Examination B or C; see "Examinations," pp. 25–27). During the five days immediately preceding this examination a typewritten copy, with approval slip signed by all members of the Special Committee, shall be on file in the office of the Graduate School. On the approval slip the name of the student (as it appears on the records in the Graduate School) and the title of the thesis must be identical with those inserted on the title page of the thesis as indicated in the form below. Under no circumstances may this final examination (B or C) be given before the thesis has been accepted and filed.

The thesis must be typewritten, double-spaced, on a durable rag bond, 8 by 10½ inches, with a left-hand margin of at least an inch and a quarter. The carbon copy need not be on bond paper. The ozalid process may be used provided the paper is bond of at least 50-per-cent rag content. *The title page must be typed.*

The title page should be set up according to the following form:

[TITLE OF THESIS]

A Thesis

Presented to the Faculty of the Graduate School of Cornell University for the Degree of
Doctor of Philosophy

By

[Author's name in full]

[Month and year in which degree is to be conferred]

Immediately following the title page there must be a biographical sketch of the author, in length not exceeding 150 words.

Before the degree can be conferred two[3] bound typewritten copies (one of which must be a ribbon copy) of the completed thesis, approved by the Special Committee, must be deposited in the office of the Graduate School. These copies become the property of the University Library.

Abstract of Thesis. The candidate must deposit in the office of the Graduate School an abstract of his thesis in two copies, typewritten, double-spaced, on bond paper, 8 by 10½ inches. The abstract should be about 1,500 words in length and should not exceed 1,700 words. It must be approved by the chairman of the Special Committee and presented in a form acceptable for printing. At present there is no provision for the publication of these abstracts.

EXAMINATIONS . . .

Qualifying Examination. The candidate must pass a qualifying examination given by his Special Committee, which may be oral or written or both. The primary purposes of this examination are: (1) to ascertain whether the candidate is qualified to continue work for the doctorate; and, if so, (2) to aid in planning his work during the remainder of his candidacy. The examination is ordinarily given at the end of the first year of graduate study, if that year is at Cornell. If the candidate has had one year or more of graduate work elsewhere, the qualifying examination should be given as soon as possible after his entrance into the Graduate School. In any event,

[3]The candidate should consult the chairman of his Committee to ascertain if additional copies are required by the department.

until the examination is taken no residence credit will be allowed after the term in which the candidate is credited with four terms of residence. The examination must be taken within one month after the beginning of a term if it is to be counted as having been taken in that term.

Any member of the Special Committee may waive his part of the qualifying examination. The report on the qualifying examination shall, however, be made by the Special Committee as a whole, after consultation. If a candidate fails to pass the qualifying examination, no re-examination shall be allowed except on recommendation of the Special Committee.

A report on each qualifying examination, whether passed, waived, or failed, shall be filed by the Special Committee in the office of the Graduate School.

Before presenting himself for Final Examination B or C (see next paragraph), a candidate must have earned at least two terms of residence credit after passing or the waiving of the qualifying examination.

Final Examination. The candidate must pass a final examination, conducted by his Special Committee and covering (1) the major and minor subjects, and (2) the thesis and related topics. At the discretion of the Special Committee, the two parts of this examination may be given either separately or in combination. At the time of taking this examination, whether the two parts are given separately or in combination, the candidate must be registered in the Graduate School, either regularly or as a candidate for degree only.

When the two parts are given separately, an examination dealing mainly with the major and minor subjects, designated as Final Examination A, may be given at the end of the fourth term of candidacy, or thereafter. Examination A may be both oral and written. The early completion of Examination A will leave the student free to devote his attention to the thesis and collateral studies during the remainder of his candidacy. Final Examination B, on the thesis and related topics and on such other work as the student may have done after completing Examination A, will be given after the residence requirement has been satisfied and the thesis has been completed and filed as provided above. This examination may be oral, or both oral and written, at the discretion of the Special Committee.

When the two parts of the final examination are given in combination, the combined examination, designated as Final Exami-

nation C, will be given after the residence requirement has been satisfied and the thesis has been completed and filed, as provided above. Examination C may be both oral and written.

No candidate may present himself for Final Examination B or C until he has satisfied the minimum period of residence and has filed the thesis as provided above.

Applications for final examinations (A, B, and C), approved by the Special Committee, must be filed in the office of the Graduate School at least five days in advance of the examination.

Final examinations are conducted by the candidate's Special Committee and are open to all members of the Faculty. At the discretion of the Special Committee, those under whom the candidate has worked may be invited to participate in the examination. But the Special Committee alone shall decide upon the merits of the candidate's performance.

A report on each final examination, whether passed or failed, shall be filed by the Special Committee in the office of the Graduate School. By permission of his Special Committee, a candidate who has failed in any of these final examinations may present himself for one re-examination, but only within a period of from six to twelve months after the failure.

Final examinations must be completed within four years after the minimum residence requirement for the degree has been satisfied.

REQUIREMENTS FOR THE DEGREE OF J.S.D.

Work leading to this degree is designed to train legal scholars and to stimulate original investigation in the purpose, administration, history, and progress of the law.

Admission. To be eligible for admission to candidacy for the degree of J.S.D., the applicant shall have met the general requirements for admission to the Graduate School as stated above (pages 8–10); shall have received the degree of Bachelor of Laws from an approved law school; shall have had some professional practice or teaching experience after obtaining that degree; and must have shown a high level of professional ability.

Residence and Special Committee. The candidate shall be in residence a minimum period of two terms working under the direction of a Special Committee of three or more chosen by the candidate after consultation with the chairman of the Division of Law. The

chairman of the Committee and one other member shall be from the Faculty of the Law School, but the other member or members may be chosen from the Graduate School Faculty in a field or fields appropriate to the candidate's graduate objective, which normally will be in the related fields of economics, government, history, business and public administration, industrial and labor relations, or philosophy.

Program. The candidate shall pursue with distinction a program of study and investigation approved by his Special Committee and acceptable to the Division of Law and shall pass with superior standing such examinations as his Special Committee shall prescribe.

Thesis. The candidate must embody the results of his investigation in a thesis which shall be a creditable contribution to legal scholarship and which shall be presented in a form suitable for publication. He is required to file two bound copies, together with two copies of a typewritten abstract thereof, in the office of the Graduate School. For the procedures to be followed in presenting the thesis see page 25.

Final Examination. After the thesis has been completed and filed in the office of the Graduate School, as provided on page 25, the candidate is required to present himself for a final examination. A report on each final examination shall be filed by the Special Committee in the office of the Graduate School. By permission of his Special Committee, a candidate who has failed in a final examination may present himself for one re-examination but only within a period of from six to twelve months after the failure.

For more information about this degree see page 178 in this Announcement and see also the Cornell Law School's *Announcement.*

REQUIREMENTS FOR THE DEGREE OF ED.D.

The program for the degree of Doctor of Education is designed to prepare the candidate, within a broad cultural context, for professional proficiency in a selected field of education. Candidates for this degree must show evidence of competency in a field of educational activity and of ability to assume a position of leadership in education. The requirements for the degree include (1) a minimum of six terms of residence credit; (2) the satisfactory completion, under the direction of a Special Committee, of a major field of concentration and two minor fields of distribution; (3) competency in two foreign languages or in the use of statistics or educational law; (4)

the presentation of an acceptable thesis and an abstract of the thesis; and (5) the passing of a qualifying examination and a final examination.

Residence Requirements. A candidate for this degree is expected to complete his residence with reasonable continuity. All requirements, including the final examination, must be completed within four years after the minimum residence requirement for the degree has been satisfied. Two terms of residence must be consecutive, of which one may be obtained under personal direction; ordinarily, these two terms should be the final terms of residence. All other requirements pertaining to residence are the same as those for the degree of Ph.D.

Special Committees. Regulations pertaining to the establishment and functions of Special Committees are the same as those for the degree of Ph.D.

Major and Minor Fields. A candidate for the degree of Ed.D. must select a major field of concentration and two minor fields of distribution properly related to and supporting the field of concentration. Fields of concentration approved for this degree are the same as the major fields listed on page 129 for the degree of Ph.D. in education. Fields of distribution will be determined in consultation with the professor representing the major field.

The candidate should consult members of the Faculty regarding his choice of a major field.

Special Requirements of Competency. A candidate for the degree of Ed.D. must demonstrate by examination competency in two of the following areas: (1) an approved foreign language; (2) a second foreign language (3) statistics as applied in education; (4) law as applied in education; (5) accounting as applied in education; or (6) some other area recommended by the Special Committee and approved by the Dean of the Graduate School. Competency in each of these areas will be determined by examination by staff members appointed for the purpose. Preparation for these examinations must be made when the candidate is not receiving residence credit, and examinations must be passed within the time limits operative in the program of work for the Ph.D. degree.

Thesis. The thesis required must meet the Ph.D. standard of scholarship and literary quality but may emphasize the critical application of knowledge to a professional problem rather than an at-

tempt to contribute new knowledge. All regulations governing the preparation and publication of the thesis and abstracts are the same as those for the degree of Ph.D.

Examinations. A candidate for the degree of Ed.D. must take a special written scholastic aptitude examination selected and administered by the School of Education in addition to the qualifying examination given by his Special Committee. The Committee shall decide the weight to be attached to the candidate's performance on this test in evaluating his fitness for candidacy. The aptitude test shall include ability to read and interpret educational literature, ability to analyze educational problems, proficiency in written English, and other aptitudes considered to be indicative of appropriate ability.

Rules governing the qualifying and final examinations are the same as those for the degree of Ph.D.

TUITION AND OTHER FEES

GENERAL REGULATION . . . Tuition and other fees become due when the student registers. The University allows twenty days of grace in each term, five days in the six-week Summer Session. The last day of grace is generally printed on the registration coupon which the student is required to present at the Treasurer's office. Any student who fails to pay his tuition charges, other fees, and other indebtedness to the University, or who, if entitled to free tuition, fails to claim it at the Treasurer's office and to pay his other fees within the prescribed period of grace, is thereby dropped from the University unless the Treasurer has granted him an extension of time to complete payment. The Treasurer is permitted to grant such an extension when, in his judgment, the circumstances of a particular case warrant his doing so. For any such extension the student is assessed a fee of $2. A reinstatement fee of $5 is assessed against any student who is permitted to continue or return to classes after being dropped from the University for default in payments. The assessment may be waived in any instance for reasons satisfactory to the Treasurer and the Registrar, when such reasons are set forth in a written statement.

Students registering at any time during the last ten weeks of any term are required to pay tuition at the rate of 10 per cent of the regular tuition of the term for each week or fraction of a week be-

tween the day of registration and the last examination day of the term. Students registering at any time during the last five weeks in the short summer courses are required to pay tuition at the rate of 20 per cent of the term's tuition for each week or fraction of a week between the day of registration and the last examination day of the term.

A tuition fee or other fee may be changed by the Trustees at any time without previous notice.

FEES PAYABLE BY GRADUATE STUDENTS . . .

Registration Deposit. A deposit of $30 must be made by every applicant for admission after the applicant has received provisional notice of acceptance, unless the candidate has previously matriculated as a student at Cornell University. Of this deposit $18 is used to pay the matriculation fee, chest X-ray, and examination blank charge; the $12 balance is a guaranty fund that must be maintained with the Treasurer until the student graduates or permanently withdraws.

A *Tuition Fee* of $150 a term is to be paid by all students registered in the Graduate School with major concentration in subjects within the state-supported colleges of the University; all others must pay a fee of $250 a term. This fee is payable at the beginning of each term.

Certain classes of students are exempt from the payment of the tuition fee. They are:

1. Graduate students holding certain appointments as University Fellows or Graduate Scholars, and holders of certain temporary fellowships and scholarships.

2. Resident Doctors upon recommendation and Honorary Fellows.

3. In addition to students exempt under the charter of the University from the payment of tuition the following persons, to the extent herein mentioned, shall also be exempt from payments of fees:

Upon recommendation by the appropriate college dean and by action of the Board of Trustees, for each appointment in a state-supported school or college, waiver of tuition in the Graduate School may be made to a member of the teaching or scientific staff, whose major field of study is in a state-supported school or college, subject to the following limitations:

(a) If the salary for the academic year is not greater than $1600, the tuition fee may be waived entirely;

(b) If the salary is greater than $1600, but not greater than $1700, 25% of the tuition will be charged and 75% waived;

(c) If the salary is greater than $1700, but not greater than $1800, 50% of the tuition will be charged and the balance waived;

(d) If the salary is greater than $1800, but not greater than $1900, 75% of the tuition will be charged and the balance waived;

(e) If the salary is greater than $1900, no waiver will be made.

The word salary as used above means total pay, that is, base pay plus any bonus.

Graduate assistants on the nine- or twelve-month basis who reside here during the summer, who are registered under Personal Direction for credit in the Graduate School, and who are required to give service in their department or college during that period may be recommended for waiver of tuition during the summer period under the above limitations. This waiver of tuition does not apply if the student registers in the Summer Session. Those who are engaged only in graduate study and not doing productive work for the department during the summer may not have their tuition waived. The amount of tuition to which the above percentages will be applied is the prorated amount of the full tuition fee based upon the maximum amount of residence credit that can be earned.

By recent action of the Board of Trustees, candidates who have completed minimum residence requirements are no longer eligible for waiver of tuition except within the limits stated above.

A *College and University Fee* of $50.00 a term, payable at the beginning of each term, is required of all students registered in the Graduate School except Honorary Fellows and Resident Doctors. This general fee contributes toward the services supplied by the libraries, Clinic and Infirmary, and the student union in Willard Straight Hall, and pays a portion of the extra costs of laboratory courses and general administration.

A graduate student who returns to the University to present his thesis and to take the final examination for an advanced degree, all other work for that degree having been previously completed, shall register as a "candidate for degree only" and shall pay only an administration fee of $20.

A *Matriculation and X-ray Fee* of $18 is required of every student upon his first entrance into the University. This fee is deducted from the registration deposit of $30, which must be paid when the student is approved for admission.

A *Graduation Fee* of $10 is required of every candidate for an advanced degree. The fee will be returned if the degree is not conferred.

A *Laboratory and Library Fee* of $10 a term is required of graduate students registered as Honorary Fellows or Resident Doctors.

Refunds of tuition and other fixed fees will be made to students who withdraw from the University, prior to the completion of a term for reasons accepted as satisfactory. For students who do not com-

plete a term, tuition and other fees will be charged at the rate of 10 per cent for each week, or fraction of a week, from the first day of registration to the date of withdrawal as certified by the College; provided, however, if withdrawal is made within six days of the date of registration, no charge is assessed. The matriculation fee will not be refunded, nor will refund of the health and infirmary fee be made to a student who has been admitted to the Infirmary.

Fees for the Summer Session. Graduate students who attend classes in the Summer Session must register both in the Graduate School and in the Summer Session; they must pay a tuition fee of $77, plus a fee of $13 for services supplied by the Clinic and Infirmary, the student union, and general administration, and also laboratory fees as listed in the *Announcement of the Summer Session.*

Motor Vehicle Registration and Parking Fees. Any student, unless he has the rank of instructor in Cornell University, who owns, maintains, or for his own benefit operates, or has in charge, a motor-driven vehicle in Tompkins County, within the immediate environment of Ithaca, is required to register his vehicle in person with the Campus Patrol, and, unless it is owned by another member of his immediate family who is a resident of Tompkins County, to pay a registration fee of $2 a term. He must present (a) written consent of his parent or guardian if he is under 21 years of age, (b) evidence that the vehicle may be legally driven in New York State, (c) evidence that the operator may legally drive in New York State, and (d) evidence that the vehicle is effectively insured against public liability for personal injury and property damage for the standard minima of 5–10–1. (Exceptions from the insurance requirement are: (1) Summer Session students who have not been registered in the University during the past term, and (2) special students who are registered for six hours or less a term.) This registration, which includes obtaining a registration sticker and paying the fee, must be completed within the registration days at the beginning of the first term if the student is then subject to the rule. If he becomes subject to the rule after that time, he has one week in which to comply with it. Late registration of a vehicle makes the student liable to a penalty of $2.

Motorcycles must be registered but may not be used anywhere on the campus during class hours.

Student Parking on the campus during University hours is *prohibited.* Exemption may be granted by the Campus Patrol when the

use of the car is essential to the student's attending classes or carrying on his academic or departmental work.

During the Summer Session, the rules are the same.

The student's registration in the University is held to constitute an agreement on his part that he will abide by its rules and regulations with regard to traffic and parking or suffer the penalty prescribed for any violation of them. All privileges here indicated may be denied a student who is not in good standing.

Personal Direction. Students carrying on studies during the summer under Personal Direction are required to register with the Registrar as well as in the Graduate School.

Students registered under Personal Direction, if they desire residence credit for their work, must pay a tuition fee proportionate to the ratio which the credit desired bears to one entire term. Such students must pay the College and University General Fee of $50.00; provided, however, that one half of this fee will be remitted if the registration is for a period not exceeding eight weeks. Such payment admits the student to the current Summer Session classes without additional tuition payments, provided that the amount paid is at least equal to that charged students registered in the Summer Session. Students registered under Personal Direction during the summer, not for credit, are exempt from the payment of tuition, but may not attend, either as visitors or for subsequent credit, any of the classes or exercises of the Summer Session.

The privilege of taking work under Personal Direction during the summer without the payment of tuition shall be restricted to bona fide candidates for degrees at Cornell University, who have been in residence during the preceding academic year.

HEALTH SERVICES AND MEDICAL CARE

These services are centered in the University Clinic (out-patient department) and in the Cornell Infirmary (hospital). Students are entitled to unlimited visits at the Clinic; laboratory and X-ray examinations indicated for diagnosis and treatment; hospitalization in the Infirmary with medical care for a maximum of fourteen days each term and emergency surgical care. (Surgery for the correction of chronic remediable defects and obstetrical services are not included.) The cost for these services is included in the College and University general fee.

The following health requirements for entering graduate students have been adopted by the Board of Trustees of Cornell University. The Board has also ruled that failure to fulfill these requirements will result in a recommendation to the Registrar that the student be denied the privilege of registering the following term.

(1) *Vaccination against Smallpox.* A satisfactory certificate of vaccination against smallpox must be filed at the Graduate School office before registration. It will be accepted as satisfactory only if it certifies that within the last five years a successful vaccination has been performed or three unsuccessful vaccination attempts have been made.

(2) *Health History.* Students accepted for admission will be required to fill out Cornell student health record forms.

(3) *Chest X-ray Film for Permanent File at the Infirmary.* This chest film may be made by a private physician within a month of entrance and presented to the Clinical Director at the time of registration; otherwise, a chest radiograph will be made during the orientation period or registration week. A charge of $2.00 for making this radiograph is included in the matriculation fee (see page 32). When a student has been away from the University for any reason for a year or more, he must have another X-ray upon re-entrance, for which he will be billed.

FOREIGN STUDENTS

The University maintains on its staff a Counselor to Foreign Students, Mr. Donald C. Kerr, whose duty is to look after the welfare of all students from other countries. He may be consulted on personal problems, social questions, or any other matter in which he may be helpful. His office is in the Administration Building, Room 144. It is suggested that all foreign students write him before coming to Ithaca or call on him immediately upon arrival. He will be glad to meet them at the train, help them find suitable living quarters, and introduce them to other University officials and members of the Faculty.

LIVING FACILITIES

It is the responsibility of each graduate student to arrange for his own living quarters. Graduate men students are, upon application, assigned to space, when available, within the Men's Residential Halls. Graduate women students are, upon application, assigned to

space, when available, within the Graduate Women's Residential Halls. Graduate women under 21 may apply for space in undergraduate dormitories and will be assigned if space is available. Undergraduate dormitory contracts entail room, board, and an allowance for personal laundry at the regular undergraduate residence charge.

University-operated rooms for men range in price from $5.00 to $10.00 a week. Similar housing for women includes a weekly allowance for personal laundry in addition to room, and the price range is from $8.50 to $10.50 a week. Unless specifically arranged in advance, contracts cover the full college year.

Off-campus rooms range in price from $5.00 to $10.00 a week, the average being from $6.00 to $7.00. It is usually impossible to arrange for room, board, and laundry at the same place off campus. There are, however, several restaurants and cafeterias on or near the campus which service the off-campus and university-housed student alike. The present estimated cost of board averages from $2.00 to $2.50 a day.

Upon assurance of admission to the University, graduate students should apply to the Office of Residential Halls, Administration Building, for specific information on both university and off-campus housing.

FINANCIAL ASSISTANCE

LOANS... Contributions from the alumni of Cornell University have made possible the establishment of a Graduate Student Loan Fund for use of graduate students already enrolled in Cornell University. Applications should be made to the office of the Dean of Men and Dean of Women. There are also loan funds for the use of women graduate students, provided by the Ithaca Branch of the Association of American University Women and the Mu Chapter of Pi Lambda Theta; written applications should be addressed to the office of the Dean of Women.

ASSISTANTSHIPS... The colleges, schools, and departments of the University regularly contract for the assistance of graduate students in teaching, research, and administration. The contracting parties and the Faculty of the Graduate School see that appointments and assignment of duties are made with proper consideration for the candidate's graduate program. Usually the duties of the assistant lie in the field of his major interest and contribute to his in-

tellectual and technical proficiency in the field. Assistants are eligible for residence credit in candidacy for advanced degrees according to the regulations printed on page 11. Those desiring appointment should apply to the department of their interest, but applications addressed to the Graduate School will be forwarded to the proper agency.

STUDENT DEANS... Women graduate students are appointed to the work-study program which trains workers in Student Personnel. Student Deans live in residence and, in addition to their activities with students, carry part-time study leading to an advanced degree. They major in Personnel or in related fields of their own choosing. Appointees receive board, room, and an honorarium ranging from $850 to $1,150 for services rendered the University. Applications should be addressed to Dean Lucile Allen, Administration Building.

FELLOWSHIPS, SCHOLARSHIPS, PRIZES

AWARD AND TENURE...Appointments to fellowships and scholarships are made on April 1 of each year. Forms for making application may be obtained from the office of the Graduate School. These applications, together with supporting documents, must be filed in the office of the Graduate School on or before the first of March.

The Faculty may combine the stipends of two or more scholarships or fellowships or may divide a fellowship into two or more scholarships. Appointments are made for one academic year.

The holder of a fellowship or a scholarship must devote his whole time to his studies, except that he may be called upon to assist in instruction up to a maximum of six clock-hours a week and for such assistance may receive extra compensation from the University. He may not accept any other appointment.[1]

The stipends of fellowships and scholarships are payable at the office of the Treasurer of the University in eight or twelve equal installments, at the option of the holder thereof, with the first payment due October 15 and the other payments due on the fifteenth of each succeeding month.

HONORARY FELLOWSHIPS...See page 9.

[1]Holders of tuition scholarships may be granted exemption from this rule.

FELLOWSHIPS AND SCHOLARSHIPS . . . The following fellowships and scholarships, except those marked with an asterisk, provide exemption from tuition but not from other fees. *(Note:* On recommendation of the Faculty, the stipend on a fellowship or scholarship may be increased to use accumulated surplus.)

General

Tuition Scholarships

The Board of Trustees has established thirty-four tuition scholarships for graduate students, four of which are specified for students in Industrial and Labor Relations. They entitle the holder to exemption from payment of tuition fees, but not other fees, for the duration of the appointment. The holder of a tuition scholarship may, upon application, be exempted from the rule requiring scholarship holders to accept no other appointment.

Allen Seymour Olmstead Fellowships

Two Allen Seymour Olmstead Fellowships, stipends, $1,000 each, are open to graduate students in any field of study in which major work for the Ph.D. degree is offered.

Glasgow University Exchange Fellowship

By agreement between Cornell and Glasgow Universities, a graduate student enrolled in candidacy for an advanced degree is given the opportunity to study in Glasgow University during the academic year in the field of his choice. The appointee receives board, room, and tuition and an allowance for travel. Residence credit is allowed under the regulations governing study *in absentia.*

Phi Kappa Phi Scholarship

The Phi Kappa Phi Scholarship, established by the Cornell chapter of Phi Kappa Phi, is open to graduate students in any field of study. In awarding the scholarship, preference is given to applicants who are members of Phi Kappa Phi. The scholarship carries free tuition in the Graduate School and a stipend fixed yearly for each succeeding year by the executive committee of the Cornell chapter of Phi Kappa Phi. For the year 1951–52 the stipend has been fixed at $200.

Cornell Sigma Xi Fellowship

The Cornell Sigma Xi Fellowship, established by the Cornell chapter of the Society of Sigma Xi, is open to graduate students in the following fields of study: mathematics, physics, chemistry, astronomy, sciences of the earth, biology in its various branches including psychology, medicine in its various branches, anthropology, and engineering in its various branches. This fellowship carries a stipend of $500.

Agriculture

Two *Henry Strong Denison Fellowships in Agriculture.* Stipends, $1000 each. These fellowships are distributed annually among the following fields: plant

sciences, animal sciences, social sciences, and agricultural engineering. Preference will be given to those applicants who expect to complete the requirements for the doctorate and who appear most promising from the standpoint of ability to conduct research.

The Clinton DeWitt Smith Fellowship in Agriculture. Stipend, $400. This fellowship is limited to students who come from farm homes and who have had farm training. Applicants should submit detailed statements covering such experience.

The University Fellowship in Agriculture. Stipend, $400.

See also Animal Biology, Botany, and Entomology.

Animal Biology

The Simon Henry Gage Fellowship in Animal Biology. Stipend, $600.

The Schuyler Fellowship in Animal Biology. Stipend, $400.

The Graduate Scholarship in Animal Biology. Stipend, $200.

The Morrison Fellowship in Livestock Feeding. Stipend, $500.

See also Agriculture and Entomology.

Architecture

The University Fellowship in Architecture, Landscape Architecture, Fine Arts, and Regional and City Planning, Stipend, $400.

Bacteriology

Applicants who wish to pursue work in Bacteriology should apply for either the fellowships in Agriculture or the scholarship in Veterinary Medicine.

Botany

The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography. Stipend, $400. Awarded in alternate years.

The Graduate Scholarship in Botany, Geology, or Physical Geography. Stipend, $200. Awarded in alternate years.

See also Agriculture.

Chemistry

These fellowships are ordinarily awarded for the last year of residence for the doctorate.

The Sage Fellowship in Chemistry. Stipend, $600.

The Du Pont Fellowship in Chemistry. Stipend, $1,200 if appointee is single, $1,800 if married.

The Carl G. Schluederberg Fellowship. Stipend, $200.

The John E. Teeple Fellowship. Stipend, $400.

Classics

One Fellowship in Greek and Latin. Stipend, $800.

This fellowship may be divided into two or more fellowships or scholarships with correspondingly reduced stipends.

Two Graduate Scholarships in Greek and Latin. Stipend, $200.

Economics

The President White Fellowship in Political and Social Science.[2] Stipend, $600. Awarded in alternate years in Government and Economics.

A Fellowship in Political Economy. Stipend, $800.

Engineering

Two or more of the following fellowships or scholarships may be combined if such combination be deemed desirable.

The McGraw Fellowship in Civil Engineering. Stipend, $400.

The Graduate Scholarship in Civil Engineering. Stipend, $200.

The Sibley Fellowship in Mechanical and Electrical Engineering. Stipend, $400. (Ordinarily awarded for work in Mechanical Engineering.)

The Charles Bull Earle Memorial Fellowship in Mechanical and Electrical Engineering. Stipend, $400. (Ordinarily awarded for work in Electrical Engineering.)

The Edgar J. Meyer Memorial Fellowship in Engineering Research. Stipend. $400. (Ordinarily awarded for work in Mechanical Engineering.)

The Elon Huntington Hooker Fellowship in Hydraulics. Stipend, $500.

*The John McMullen Graduate Scholarships**

The John McMullen Graduate Scholarships are open to candidates for advanced degrees in Aeronautical, Chemical, Civil, Electrical, or Mechanical Engineering. With the proceeds of the bequest the Board of Trustees has established fifteen scholarships of an annual value of $1,200 each. The scholarships have not been assigned to any particular school of the College of Engineering. Applications should be addressed to the Graduate School.

English

The Martin Sampson Teaching Fellowship. Stipend, $1,250. See page 53.

The Cornell Fellowship in English. Stipend, $600.

Entomology

The Comstock Scholarship in Entomology. Stipend, $150. See also under Agriculture and Animal Biology.

Far Eastern Studies

Eight *Training Fellowships on Southeast Asia.** Stipend, $1,550. These fellowships in the Cornell Southeast Asia Program will be awarded each year to selected students who, while working for a higher degree in one of the several fields of instruction of the Graduate School, will at the same time follow a prescribed course of study and research devoted to Southeast Asia.

Two *Southeast Asian Fellowships.** Stipend, $2,000. These fellowships will be awarded each year to selected students from the countries of Southeast Asia who, while working for a higher degree in one of the several fields of instruction of the

[2]Holders of the President White Fellowships in Modern History and in Political and Social Science may be called upon to be in attendance for a certain period each day in the President White Library, where they will ordinarily do a large part of their study.

Graduate School, will at the same time follow a prescribed course of study and research relating to Southeast Asia.

Geology

The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography. Stipend, $400. Awarded in alternate years.

The Graduate Scholarship in Botany, Geology, or Physical Geography. Stipend, $200. Awarded in alternate years.

The Eleanor Tatum Long Graduate Scholarship in structural Geology is open to graduate students who are majoring in this branch of geology. The stipend is approximately $1,200 a year.

*Charles Bean DeLong Graduate Research Fund**

A fund of $6,000, the income from which is to be used at the discretion of the Department of Geology for the purpose of assisting male graduate students or assistants of the University who are majoring in and carrying out scientific research in economic or structural geology.

German

The University Fellowship in German Studies. Stipend, $400.

Government

The President White Fellowship in Political and Social Science. Stipend, $600. Awarded in alternate years in government and economics.

History

These fellowships are ordinarily awarded only to applicants who have completed a year of graduate work or are able to submit written work of superior quality.

The President White Fellowship in Modern History.[3] Stipend, $500. In the discretion of the Faculty this fellowship may be made a traveling fellowship, with a stipend of $800.

The Fellowship in American History. Stipend, $400.

The George C. Boldt Fellowship in History. Stipend, $1,000.

The Graduate Scholarship in History. Stipend, $200.

Home Economics

The Anna Cora Smith Fellowship. Stipend, $400.

Mathematics

The Erastus Brooks Fellowship in Mathematics. Stipend, $600.

Nature Study

The Comstock Scholarship in Nature Study. Stipend, $150.

*American Nature Association Research Fellowship.** Two or three American

[3]Holders of the President White Fellowships in Modern History and in Political and Social Science may be called upon to be in attendance for a certain period each day in the President White Library, where they will ordinarily do a large part of their study.

Nature Association research fellowships of $400 to $600 are available to graduate students in nature study.

Philosophy

Three *Susan Linn Sage Fellowships in Philosophy*. Stipends, $600 each. One or more of these fellowships may be divided to make two scholarships, stipends $300 each.

Physics

The President White Fellowship in Physics. Stipend, $600. The stipend of this Fellowship may, in the discretion of the Faculty, be reduced to $400 and the remaining $200 be assigned to a Graduate Scholarship.

Psychology

The John Wallace Dallenbach Fellowship in Psychology. Stipend, $800.

The Susan Linn Sage Fellowship in Psychology. Stipend, $400.

The Susan Linn Sage Graduate Scholarship in Psychology. Stipend, $200.

Romance Studies

The University Fellowship in Romance Studies. Stipend, $400.

Veterinary Medicine

The Graduate Scholarship in Veterinary Medicine. Stipend, $200.

Through accumulation it is sometimes possible to increase the amount available for this scholarship.

Temporary Fellowships*

There are regularly available a number of other fellowships, usually offered by industrial concerns to graduate students in Cornell University who are studying in a field of interest to the donor. Since these fellowships are established for a limited period or for a series of years, they are not listed here; but some of the appointees to such fellowships for the year 1950–51 are named on page 189. All such fellowships are awarded by action of the Faculty of the Graduate School. Inquiries about those currently available will be referred by the office of the Graduate School to the department concerned.

The Graduate Prize in Philosophy

Open for competition to all students registered in the Graduate School. See pages 63–64.

FIELDS OF INSTRUCTION

The several fields of instruction of the Graduate School are described in the pages that follow.

ARRANGEMENT OF SUBJECTS . . . Subjects are grouped in broad fields as follows, and in the following order:

Architecture and the Fine Arts; Far Eastern Studies; Languages and Literatures; Music; Philosophy; History and the Social Sciences; Animal Sciences; Plant Sciences; Physical Sciences; Agriculture; Education; Engineering; Home Economics; Hotel Administration; Industrial and Labor Relations; Law; Veterinary Medicine; and the *Medical Sciences* as presented in the Medical College, New York City.

APPROVED MAJOR AND MINOR SUBJECTS . . . For each field there is given an approved list of titles from which candidates for advanced degrees choose major and minor subjects. The numerals 1, 2, 3, 4 have the following meaning:

1, approved as major subject for the Ph.D.
2, approved as major subject for the Master's degree.
3, approved as minor subject when the major is in the same field.
4, approved as a minor subject when the major is in another field.

UNDERGRADUATE AND GRADUATE COURSES . . . In the main, courses intended primarily for advanced undergraduate students but often meeting the needs of graduates are not listed or described in this catalogue. For all such courses, the student should refer to the Announcement of the college in which the course is offered.

PREREGISTRATION FOR COURSES . . . To assure proper distribution of facilities, preregistration is required for all courses where staff and facilities are comparatively inflexible. Courses requiring preregistration are so marked in the descriptions. The preregistration periods normally occur about six weeks before the end of the semester preceding, and registered students are informed. New students and those not on campus are advised to write to the department concerned or to the office of the Graduate School as soon as they know that they want a place reserved in courses.

ARCHITECTURE AND THE FINE ARTS

The Division of Architecture and the Fine Arts has jurisdiction over work leading to the degrees of Master of Architecture, Master of Landscape Architecture, Master of Regional Planning, and Master of Fine Arts. These degrees are intended for those primarily interested in the practice of the various fields given below. Students of the history and theory rather than the practice of these fields of study should become candidates for the Master of Arts degree.

HOUSING RESEARCH CENTER

The purpose of the Housing Research Center is to aid and guide basic research in the field of housing, to facilitate graduate study, and to route housing information among colleges and departments and between the University and sources of information off campus. A small central staff facilitates the initiation and conduct of projects.

The facilities of the Housing Research Center are available to Faculty members and graduate students in all colleges of the University. Through the Center students who cut across traditional lines of research endeavor may draw upon the knowledge and experience of specialists in such various subject areas as design, materials, equipment, structural methods, environment, family living, economics and finance, government, and health. Students interested should communicate with Professor G. H. Beyer, Director of the Center.

ARCHITECTURE

Professors S. M. Barnette, H. E. Baxter, L. D. Brown, T. H. Canfield, A. H. Detweiler, F. W. Edmondson, J. A. Hartell, T. W. Mackesey, E. D. Montillon, J. N. Tilton, Jr., F. M. Wells, and visiting critics.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Architectural Construction 2, 3, 4

History of Architecture 2, 3, 4

Architectural Design 2, 3, 4

Graduate work is offered in architectural design, in the history of architecture, and in advanced construction. Candidates for the degree of Master of Architecture must have had preliminary training in the subjects elected for graduate work equivalent to that required in like subjects in this university for the degree of Bachelor of Architecture.

The facilities for graduate work in architecture are excellent. Large well-lighted drafting rooms and studios are provided, and a special architectural library, comprising 12,000 books, 20,000 mounted photographs, 45,000 lantern slides, and numerous original drawings, is situated in White Hall where it is easily accessible to the student. Instruction is given by means of lectures, seminar discussions, and especially by direct personal criticism and advice. For specific courses offered see the *Announcement of the College of Architecture.*

REGIONAL AND CITY PLANNING

Professors G. D. Clarke, F. W. Edmondson, T. W. Mackesey; Mr. R. C. Hoover, and other members of the University Faculty.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

City Planning 1, 2, 3, 4 Regional Planning 1, 2, 3, 4

Graduate work is offered in regional and city planning leading to the degrees of Master in Regional Planning and Doctor of Philosophy. The purpose of graduate work in regional and city planning is to offer to adequately trained students facilities for advanced study and research, with the twofold purpose of providing each student with a comprehensive view of the field of planning and of training him for independent investigation in that field. Students may approach advanced work in planning from a background of study in any one of a number of related fields including architecture, landscape architecture, engineering, government, geography, sociology, economics, or agriculture. Each graduate student follows a plan of study drawn up in consultation with a Faculty Committee. That plan of study is based on the individual student's background and interests.

700. *HISTORY OF CITY PLANNING.* Fall term. Credit three hours. Professors DETWEILER and MACKESEY.

710. *PRINCIPLES OF REGIONAL AND CITY PLANNING.* Fall term. Credit three hours. Professor MACKESEY.

711. *CITY PLANNING PRACTICE.* Spring term. Credit three hours. Prerequisite, Course 710. Professor MACKESEY.

713. *HOUSING.* Fall term. Credit two hours. Registration limited. Prerequisite, Course 710. Professor ——.

715. *PUBLIC PROBLEMS IN URBAN LAND USE.* Fall term. Prerequisite, Course 710. Credit two hours. Mr. HOOVER.

717. *ZONING PRINCIPLES AND PRACTICE.* Spring term. Credit two hours. Prerequisite, Course 710. Mr. HOOVER.

718. *CITY PLANNING DESIGN.* Either term. Credit arranged. Professor EDMONDSON.

719. *CITY AND REGIONAL PLANNING RESEARCH.* Either term. Credit arranged. Professors CLARKE, EDMONDSON, and MACKESEY.

LANDSCAPE ARCHITECTURE

Professors G. D. CLARKE, F. W. EDMONDSON, and E. D. MONTILLON, and members of the Faculty in Architecture.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Landscape Architecture 2, 3, 4

Graduate work in Landscape Architecture is offered in design, history, and planting design. Candidates for the degree of Master of Landscape Architecture must have had preliminary training in the subjects elected for graduate work equivalent to that required in like subjects in this university for the degree of Bachelor of Science in Land Planning. For specific courses offered see the *Announcement of the College of Architecture.*

PAINTING AND SCULPTURE

Professors N. D. DALY, KENNETH EVETT, D. L. FINLAYSON, J. M. HANSON, J. A. HARTELL, R. P. LANG, J. O. MAHONEY; MR. VICTOR COLBY.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Painting 2, 3, 4 Sculpture 2, 3, 4

The degree of Master of Fine Arts will be granted to candidates with a special aptitude for the practice of painting or sculpture who have a basic general education and who have qualified themselves in the history and theory of art.

Entering students must present at least 30 hours of studio work in these fields, or its equivalent, and must submit examples of their work. Two years' residence will normally be required and candidates must supplement work in the practice of art with a related program in the history and theory of art. At the end of his third term of residence each candidate will present an exhibition of work done while in residence and take a comprehensive examination in the history and theory of the art of his special interest. A thesis consisting of a creative project will be presented at the end of the fourth term of residence. Instruction in painting and sculpture is given by the staff of the College of Architecture. For further information consult the Announcement of that College.

Either painting or sculpture may also be elected as minor fields of study for the degree of Master of Arts.

The degree of Master of Education, administered by the School of Education under the jurisdiction of the Graduate School, is offered for those students who wish to prepare themselves for the teaching of art in the secondary schools.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Architecture,* Department of Painting and Sculpture.

STUDIO COURSES

The following courses constitute advanced work in the several fields they cover. They offer a study of the various artistic and technical problems inherent in the production of works of art in these fields through projects chosen by the student.

390. *PAINTING AND COMPOSITION.* Either term. Credit as assigned. May be repeated for credit. Open to qualified graduate students only.

396. *SCULPTURE.* Either term. Credit as assigned. May be repeated for credit. Open to qualified graduate students only.

SEMINARS

The following courses are for qualified graduate students only. They may be taken either term and may be repeated for credit.

395. *SEMINAR IN THE THEORY OF ART.* Credit two hours.

397. *SEMINAR IN THE THEORY OF SCULPTURE.* Credit two hours.

398. *SEMINAR IN ART CRITICISM.* Credit two hours.

399. *SEMINAR IN THE TEACHING OF ART.* Credit two hours. Offered with the cooperation of the school of Education.

DRAMA AND THE THEATRE

Professors H. D. ALBRIGHT, R. C. BALD, A. M. DRUMMOND, J. A. HARTELL, H. A. MYERS, W. H. STAINTON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Dramatic Production 2, 3, 4 — Playwriting 2, 3, 4

Dramatic Technique 2, 3, 4

The degree of Master of Fine Arts in drama and dramatic production will be granted to candidates of special aptitude in the practical phases of dramatic

production or playwriting. Their program must include suitable studies in related Fine Arts; two years of residence will normally be required, with approximately one-half the program of study in applied projects in stage presentation; a major practical project in the second year will be the thesis.

For information on programs leading to the degrees of Master of Arts and Doctor of Philosophy in dramatic production see Speech and Drama, page 59.

THE CORNELL UNIVERSITY THEATRE provides opportunities for public presentation of the work of graduate students in dramatic interpretation and acting and in playwriting.

HISTORY OF ART AND ARCHAEOLOGY

Professors D. L. FINLAYSON, N. A. PATTILLO, F. O. WAAGÉ.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Archaeology 1, 2, 3, 4 History of Art 2, 3, 4

Graduate work is offered in the general field of the history of the visual arts (architecture, painting, sculpture, and the minor arts). To elect this as a major subject the candidate must present undergraduate preparation comparable to the major course in Fine Arts, option 2 (Visual Arts course) in the College of Arts and Sciences at Cornell. Instruction will be offered through advanced undergraduate courses (for which see the *Announcement of the College of Arts and Sciences,* Fine Arts) and through independent study and research under individual direction.

The same conditions will usually apply in the election of work in the general field of archaeology as a major subject; however, in undergraduate preparation relevant courses in such subjects as cultural anthropology may be substituted for some of those in art history, and for graduate work in classical archaeology courses in Latin and Greek may be so substituted.

The history of art and archaeology are approved as major subjects for the Master of Arts, but not for the Master of Fine Arts, degree; candidates for the Master of Fine Arts degree may, however, elect history of art as a minor subject.

FAR EASTERN STUDIES

Professors KNIGHT BIGGERSTAFF, H. W. BRIGGS, C. F. HOCKETT, M. E. OPLER, N. A. PATTILLO, E. P. REUBENS, H. E. SHADICK, and LAURISTON SHARP; MISS GUSSIE E. GASKILL.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Chinese Literature 2, 3, 4 Far Eastern Studies 4

Cornell has special graduate programs on China and Southeast Asia. Graduate students in the China program may major in Chinese history (see History and the Social Sciences) or in Chinese literature; or they may major in another department with a minor in Far Eastern Studies or Chinese history.

Graduate students in the Southeast Asia program may major in any discipline, with a minor in Far Eastern Studies. Beginning in 1951–52, thorough training on Southeast Asia will be provided through a considerable expansion of teaching and research facilities. A number of fellowships are available; inquiries should be addressed to the Southeast Asia Program of the Department of Far Eastern Studies.

In the Wason Collection, Cornell possesses one of the best European-language libraries on China and the Chinese in the world; also an outstanding European-language library on Southeast Asia. The Chinese-language materials, amounting to some fifty thousand volumes, are particularly strong in bibliography, literature, modern history, and the various aspects of contemporary Chinese civilization.

INTRODUCTION TO LITERARY CHINESE. Throughout the year. Professor SHADICK. (Chinese 201–212)

INTERMEDIATE COLLOQUIAL CHINESE. Throughout the year. Professor HOCKETT. (Chinese 203–214)

LINGUISTIC STRUCTURE OF CHINESE. Spring term. Professor HOCKETT. (Chinese 232)

CHINESE LITERATURE IN TRANSLATION: PHILOSOPHICAL AND HISTORICAL LITERATURE. Fall term. M W F 10. Professor SHADICK. (Literature 321)

CHINESE LITERATURE IN TRANSLATION: IMAGINATIVE LITERATURE. Spring term. M W F 10. Professor SHADICK. (Literature 322)

351–352. *READINGS IN CHINESE LITERATURE: CLASSICAL AND MODERN.* Throughout the year. Prerequisite: Chinese 212 and 214. Professor SHADICK.

375–376. *SEMINAR IN CHINESE LITERATURE.* Throughout the year. Professor SHADICK.

HISTORY OF CHINESE CIVILIZATION. Professor BIGGERSTAFF. (History 161–162)

THE MODERNIZATION OF CHINA. Professor BIGGERSTAFF. (History 811–812)

SEMINAR IN MODERN CHINESE HISTORY. Professor BIGGERSTAFF. (History 875–876)

INTRODUCTION TO FAR EASTERN ART. Professor PATTILLO. (Fine Arts 601–602)

602. *CONTEMPORARY SOUTHEAST ASIA.* Fall term. Credit and hours to be arranged. Prerequisite, Course 202 or equivalent, or may be taken concurrently with Course 202. Professor SHARP and staff.

[*NATIVE CULTURES OF THE PACIFIC.* Professor SHARP. (Sociology and Anthropology 605) Not given in 1951–52.]

SEMINAR: CULTURE AND CULTURE CHANGE IN INDIA. Fall term. Professor OPLER. (Sociology and Anthropology 683)

SEMINAR: CULTURE AND CULTURE CHANGE IN SOUTHEAST ASIA. Spring term. Professor SHARP. (Sociology and Anthropology 685)

[*ECONOMICS OF THE FAR EAST.* Professor REUBENS. (Economics 801–802). Not given in 1951–52.]

FAR EASTERN POLICY OF THE UNITED STATES. Professor BRIGGS. Fall term. (Government 417)

951–952. *SEMINAR IN FAR EASTERN STUDIES.* Throughout the year. T 2–4. Far Eastern Studies staff.

There will be two research seminars on Southeast Asia offered each year, taught by resident and visiting staff members.

The attention of graduate students is also called to the following introductory courses, listed in the *Announcement of the College of Arts and Sciences,* which may be of interest to them: Chinese 101–102 *(Elementary Colloquial Chinese);* Far Eastern Studies 201 *(Introduction to Contemporary China),* 202 *(Introduction to Contemporary Southeast Asia),* and 206 *(Introduction to Contemporary India).*

LANGUAGES AND LITERATURES

THE CLASSICS

Professors EDWARD L. BASSETT, HARRY CAPLAN, JAMES HUTTON, GORDON M. KIRKWOOD, FRIEDRICH SOLMSEN, F. O. WAAGÉ.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Latin Language and Literature 1, 2
Latin Literature 2, 3, 4
Latin Language 3, 4
Vulgar Latin 3, 4
Medieval and Renaissance Latin Literature 1, 2, 3, 4
Classical Rhetoric (in translation) 3, 4
Greek Language and Literature 1, 2
Greek Literature 2, 3, 4
Greek Language 3, 4
Comparative Indo-European Linguistics 1, 3, 4
Classical Archaeology 1, 2, 3, 4

Admission to graduate study in a subject included in the group of the classics, except in archaeology, assumes a knowledge of the field selected equivalent in general to that expected of a student who has pursued the subject concerned throughout four years of undergraduate study in a college of recognized standing.

Graduate work in the classics is conducted in the main by the seminar system, the object of which is training in the methods, the principles, and the performance of independent research and criticism, and the work is therefore as far as possible put into the hands of the students themselves. Subjects additional to those investigated in the seminar courses are ordinarily treated in courses of lectures. A seminar room in the Library building is reserved for the exclusive use of graduate students in the classics.

For fellowships in Greek and Latin, see page 39.

The income of the Charles Edwin Bennett Fund for Research in the Classical Languages is used each year in the way best suited to promote the object for which the fund was established.

Doctoral dissertations of an appropriate nature will be accepted for publication in the *Cornell Studies in Classical Philology*.

GREEK

For undergraduate courses, which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Classics.

301–302. *ARISTOPHANES, CLOUDS; SOPHOCLES, OEDIPUS REX; HERODOTUS.* Throughout the year. Credit three hours a term. Prerequisite, Greek 201 or the equivalent. M W F 3. Professor SOLMSEN.

305–306. *LYRIC POETRY; AESCHYLUS, PROMETHEUS VINCTUS; THEOCRITUS; DEMOSTHENES, PHILIPPICS.* Throughout the year. Credit three hours a term. Prerequisite, Greek 301–302. M W F 9. Professor CAPLAN.

[307–308. *PLATO, THE REPUBLIC; PINDAR, SELECTED ODES; THUCYDIDES.* Throughout the year. Credit three hours a term. Not given in 1951–52.]

309–310. *ADVANCED GREEK COMPOSITION.* Throughout the year. Credit one hour a term. T 2. Assistant Professor KIRKWOOD.

365–366. *SEMINAR: SOPHOCLES.* Throughout the year. Credit three hours a term. Library, Classical Seminar Room. W 2–4. Professor KIRKWOOD.

[375–376. *SEMINAR. PLATO.* Throughout the year. Not given in 1951–52.]

See also History: Ancient History, and Philosophy; Greek Philosophy.

LATIN

For undergraduate courses, which often meet the needs of graduate students, see Classics in the *Announcement of the College of Arts and Sciences.*

[315–316. *THE GREATER REPUBLICAN WRITERS: PLAUTUS, CICERO, LUCRETIUS.* Throughout the year. Credit three hours a term. Not given in 1951–52.]

317–318. *LITERATURE OF THE EARLY EMPIRE: TACITUS, ANNALS; JUVENAL; PLINY'S LETTERS; SENECA'S LETTERS.* Throughout the year. Credit three hours a term. T Th S 9. Fall term, Professor HUTTON; Spring term, Assistant Professor BASSETT.

321–322. *LATIN COMPOSITION: ADVANCED COURSE.* Throughout the year. Credit one hour a term. W 2. Professor SOLMSEN.

[381–382. *SEMINAR: CLASSICAL RHETORIC.*]

383–384. *SEMINAR: PLAUTUS.* Throughout the year. Credit three hours a term. Library, Classical Seminar Room. T 2–4. Professor CAPLAN.

GREEK AND LATIN LINGUISTICS

[347. *HISTORY OF THE LATIN LANGUAGE.* Credit two hours. Not given in 1951–52.]

348. *VULGAR LATIN: PETRONIUS, CENA TRIMALCHIONIS; VULGAR LATIN INSCRIPTIONS.* Fall term. Credit two hours. T Th 12. Assistant Professor BASSETT.

[350. *COMPARATIVE GRAMMAR OF GREEK AND LATIN.* Credit two hours. Not given in 1951–52.]

389. *GREEK DIALECTS.* Spring term. Credit two hours. T Th 12. Assistant Professor BASSETT.

[390. *ITALIC DIALECTS.* Credit two hours. Not given in 1951–52.]

See also General Linguistics.

CLASSICAL ARCHAEOLOGY.

For undergraduate courses, which often meet the needs of graduate students, see Fine Arts in the *Announcement of the College of Arts and Sciences.*

[315. *NUMISMATICS: ANCIENT COINAGE.* Not given in 1951–52.]

377. *PAUSANIAS AND THE TOPOGRAPHY OF GREECE WITH SPECIAL REFERENCE TO ATHENS.* First term. Hours to be arranged. Goldwin Smith 37. Professor WAAGÉ.

378. *PROBLEMS IN CLASSICAL ARCHAEOLOGY.* Second term. Hours to be arranged. Goldwin Smith 37. Professor WAAGÉ.

ENGLISH LANGUAGE AND LITERATURE

Professors M. H. ABRAMS, R. M. ADAMS, R. C. BALD, R. H. ELIAS, F. B. FREEMAN, W. H. FRENCH, BAXTER HATHAWAY, G. H. HEALEY, C. W. JONES, F. E. MINEKA, H. A. MYERS, W. M. SALE, H. W. THOMPSON; *Drs.* J. W. BICKNELL, G. F. CRONKHITE, DAVID NOVARR, E. B. PARTRIDGE, R. J. SCHOECK.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Medieval Literature 1, 2, 3, 4
Old and Middle English 1, 2, 3, 4
The English Renaissance to 1660 1, 2, 3, 4
The Restoration and the Eighteenth Century 1, 2, 3, 4
The Nineteenth Century and After 1, 2, 3, 4
American Literature 1, 2, 3, 4
English Poetry 1, 2, 3, 4
Dramatic Literature 1, 2, 3, 4
Prose Fiction 1, 2, 3, 4
Folk-Literature 3, 4
Creative Writing 2, 3 (for M.A.), 4 (for M.A.)

The type of work within each subject will vary according as it is chosen for a major or a minor, and for the Master's or Doctor's degree. A candidate is expected to choose his major and minor subjects within two weeks after registration. If he wishes to be put in touch with proper directors for the work he has in mind, he may call at or write to the Department of English, Goldwin Smith Hall.

In the Cornell University Library are collections for advanced work in every division of English literature; those in Old and Middle English, in Elizabethan and nineteenth-century literature, and in folklore are especially rich. In addition, the Department has a separate collection, the Hart Memorial Library, with many reference books and ample table space. Adjacent to this is the Goldwin Smith Library, in which are other valuable sets and volumes.

The *Cornell Studies in English* is a series of monographs in which the work of graduates and members of the staff may be published. Thirty-seven numbers have appeared. The more recently established series of *Cornell Studies in American History, Literature, and Folklore* provides for the publication of editions, monographs, and essays by students registered in any college of the University.

In general, thirty-six hours of college English are required before a student may enter upon candidacy for an advanced degree. Work in philosophy, history, and the languages, ancient and modern, may, if it is of good quality, be counted against a shortage in undergraduate English. Training in the Greek and Latin literatures is especially acceptable. A candidate for the degree of Doctor of Philosophy must have at least a full-year course in Old English. In addition to passing examinations in French and German (see page 22), he may be required by his Special Committee to demonstrate a reading knowledge of Latin. The candidate for the degree of Master of Arts, Plan A, must have sufficient knowledge of French or German to make use of scholarly works in one of these languages.

All applicants for admission to the Graduate School should include in their application papers the results of a Graduate Record Examination (see page 8).

Successful study leading to the doctorate with the major in any one of the subjects listed above requires not only a balanced undergraduate training in the arts and sciences with a concentration in languages and literature, but also mature habits of reading and appreciation. Since entrance credentials cannot establish the presence of these habits, applicants intending to major in one of these subjects are admitted to the Graduate School as noncandidates and are required to pass an oral examination before admission to candidacy for the degree. A reading list useful in preparing for this examination may be obtained by writing to or calling at the office of the Department of English. The examiners may also require a composition to test the student's ability to write critical prose. To be admitted to candidacy and to become eligible for residence credit for his first term of attendance, the student must pass the examination within one month after registration. If he is successful, his Special Committee may consider that he

has passed the qualifying examination described on page 25 of this announcement.

The Graduate School requires that a candidate for the doctorate be in residence for at least six terms, but his Special Committee may recommend that he be given credit for one, or at most two, terms of graduate work done elsewhere. The Special Committee may also recommend residence credit for work done at the graduate level at Cornell previous to candidacy.

When a student has completed studies in his major and minor subjects, he will be given Final Examination A by his Special Committee. When his thesis has been accepted, he will be given Final Examination B by the same committee.

Rules in the three preceding paragraphs apply to students entering in or after the fall term of 1949.

During the period from July to September, members of the staff will not ordinarily supervise or recommend residence credit for work leading to any degree except that of Master of Arts, Plan B. Hence graduate students who expect to earn all residence credit by attendance in summer sessions may be candidates for only this one degree.

For further information about examinations, see pages 17, 19, 26–27.

The Martin Wright Sampson Teaching Fellowship, to the value of $1050, with exemption from tuition fees, and one fellowship of $600, also carrying exemption from tuition fees, are awarded annually to graduate students in English. To receive consideration, applicants must ordinarily have completed a year of graduate study. The Department may also nominate deserving applicants for the Allen Seymour Olmstead and the Phi Kappa Phi Fellowships (see page 38) and for tuition scholarships in the Graduate School (see page 38). Furthermore, several part-time teaching appointments are often available to men working for advanced degrees.

Instruction in English available to candidates for advanced degrees is listed below in three groups: I, courses open to undergraduates as well as graduate students; II, courses at a more advanced level open only to graduate students; and III, intensive and specialized study available to candidates for the doctorate. The candidate for the Master's degree under Plan A is ordinarily expected to have completed successfully at least three two-term courses from Groups I and II, or to have completed courses which his Special Committee deems equivalent in scope and quality. The candidate for the Doctor's degree is ordinarily expected to have completed successfully at least six two-term courses, including four from Groups II and III, or to have completed six courses which his Special Committee deems equivalent in scope and quality.

GROUP I. Graduate students taking the following courses are expected to do extra work in order to obtain graduate credit. For further descriptions see the *Announcement of the College of Arts and Sciences,* Department of English and Division of Literature.

305–306. *OLD ENGLISH PROSE AND POETRY.*

309–310. *ENGLISH NON-DRAMATIC LITERATURE, 1550–1660.*

312. *THE SEVENTEENTH CENTURY.*

313–314. *ENGLISH LITERATURE, 1660–1790.*

317–318. *THE ROMANTIC PERIOD.*

321–322. *THE VICTORIAN PERIOD.*

329–330. *AMERICAN LITERATURE.*

337. *THE MODERN ENGLISH NOVEL.*

345. *THE DRAMA OF THE RESTORATION AND THE EIGHTEENTH CENTURY.*

355. *AMERICAN FOLK-LITERATURE.*

357. *BALLAD AND FOLKTALE.*

365–366. *CHAUCER AND HIS AGE.*

369–370. *SHAKESPEARE.*

373. *MILTON.*

377. *EMERSON, THOREAU, AND WHITMAN.*

379. *POE, HAWTHORNE, AND MELVILLE.*

380. *MARK TWAIN, HOWELLS, AND JAMES.*

382. *THE ENGLISH LANGUAGE.*

385–386. *NARRATIVE WRITING.*

388. *VERSE WRITING.*

389. *ADVANCED EXPOSITION.*

485–486. *SEMINAR IN WRITING.*

Literature 201–202. *ENGLISH TRANSLATIONS OF GREEK AND LATIN CLASSICS.*

Literature 207. *FOUNDATIONS OF WESTERN THOUGHT.*

Literature 211–212. *SURVEY OF MEDIEVAL LITERATURE.*

Literature 301–302. *DRAMA AND THE THEATRE.*

Literature 311–312. *EUROPEAN FICTION.*

Literature 321–322. *CHINESE LITERATURE IN TRANSLATION.*

Literature 401–402. *PRINCIPLES OF LITERARY CRITICISM.*

Literature 411. *THE PSYCHOLOGY OF LITERATURE.*

Literature 421. *MODERN LITERARY CRITICISM.*

Speech and Drama 455. *AMERICAN DRAMA AND THEATRE.*

Speech and Drama 461–462. *PLAYWRITING.*

German Literature 301–302. *MASTERS OF GERMAN LITERATURE.*

GROUP II. Courses open to graduate students only. Not all of these can be offered, but persons interested in particular courses should address inquiries to the Department. If enough students apply, hours and a room for a course will be arranged. Candidates for the degree of Master of Arts, Plan B, will receive three hours of credit a term for each course taken.

501. *BIBLIOGRAPHY AND METHOD.* Fall term. Mr. BALD. Recommended for all candidates for the doctorate.

503–504. *MIDDLE ENGLISH LITERATURE.* Fall and spring terms. Mr. FRENCH.

507–508. *ELIZABETHAN LITERATURE.* Fall and spring terms.

510. *SEVENTEENTH-CENTURY LITERATURE.* Spring term. Mr. BALD.

[512. *SHAKESPEARE.* Spring term. Mr. BALD. Not given in 1951–52.]

513–514. *EIGHTEENTH-CENTURY LITERATURE.* Fall and spring terms. Mr. HEALEY.

516. *THE ROMANTIC PERIOD.* Fall term. Mr. ABRAMS.

535–536. *VICTORIAN LITERATURE.* Fall and spring terms. Mr. MINEKA.

541–542. *AMERICAN LITERATURE.* Fall and spring terms. Mr. THOMPSON.

546. *PROSE FICTION.* Spring term. Mr. SALE.

551–552. *DRAMATIC LITERATURE.* Fall and spring terms. Mr. MYERS.

555. *ENGLISH POETRY.* Fall term.

557–558. *SEMINAR IN WRITING.* Fall and spring terms. Mr. HATHAWAY.

GROUP III. Specialized study for candidates for the doctorate. These course numbers will be used by arrangement with the professor designated, but the work may be supervised by others.

601–602. *OLD AND MIDDLE ENGLISH.* Mr. FRENCH.

605–606. *MEDIEVAL LITERATURE.* Mr. JONES.

607–608. *ELIZABETHAN LITERATURE.*

609–610. *THE ENGLISH DRAMA TO 1700.* Mr. BALD.

611–612. *SEVENTEENTH-CENTURY LITERATURE.* Mr. BALD.

613–614. *EIGHTEENTH-CENTURY LITERATURE.* Mr. ABRAMS.

615–616. *THE ROMANTIC PERIOD.* Mr. MINEKA.

635–636. *VICTORIAN LITERATURE.* Mr. MINEKA.

641–642. *AMERICAN LITERATURE.* Messrs. THOMPSON and MYERS.

645–646. *PROSE FICTION.* Mr. SALE.

651–652. *DRAMATIC LITERATURE.* Mr. MYERS.

653–654. *CONTEMPORARY LITERATURE.* Mr. SALE.

657–658. *FOLK-LITERATURE.* Mr. THOMPSON.

GENERAL LINGUISTICS

Professors F. B. AGARD, E. L. BASSETT, J. M. COWAN, G. I. DALE, G. H. FAIRBANKS, W. H. FRENCH, R. A. HALL, JR., C. F. HOCKETT, W. G. MOULTON, C. K. THOMAS.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

General Linguistics 1, 2, 3, 4

The following more specialized linguistic fields, listed elsewhere, are also available: Latin Language, Greek Language (see The Classics); Old and Middle English (see English Language and Literature); Germanic Linguistics (see German Studies); French, Spanish, and Romance Linguistics (see Romance Studies); and Slavic Linguistics (see Russian Studies). In any of these, emphasis is laid on (1) methodology, and (2) the body of results already attained in the field; but in General Linguistics the primary emphasis is on (1), in the linguistics of a specified language or group of languages the primary emphasis is on (2).

A student majoring in General Linguistics for the Ph.D. must choose Cultural Anthropology as one of his minors.

The Cornell Linguistics Club, open to all interested, meets biweekly throughout the school year and affords an opportunity for the presentation and discussion of current developments of topics of research.

201, 202. See *Announcement of the College of Arts and Sciences.*

203–204. *LINGUISTIC ANALYSIS.* Throughout the year. Credit three hours a term. General Linguistics 201 is a prerequisite or concurrent for 203; 203 is a prerequisite for 204. M W F 9, and a fourth hour to be arranged. Associate Professor HOCKETT.

[205. *FIELD METHODS.* Fall term. Credit three hours. Prerequisite, 204.

Hours to be arranged; four class hours a week may be required. Associate Professor HOCKETT.]

211, 212. *ACOUSTICAL PHONETICS.* Throughout the year. Credit three hours a term. Hours to be arranged. Professor COWAN.

290. *SEMINAR.* Each term. Admission by permission of the instructor. Hours and credit to be arranged. Various members of the Staff.

The following courses, described elsewhere, can be included in a program of work in General Linguistics with the permission of the student's Special Committee: Latin 347, 348, 350, 390 (see The Classics); English 305, 306, 601, 602 (see English Language and Literature); German 232, 241, 242, 281, 282, 290 (see German Studies); Speech and Drama 333, 334, 336 (see Speech and Drama); French 232, 241, 242, 290, Italian 290, Spanish 232, 241, 242, 290, Romance Linguistics 281, 282, 290 (see Romance Studies); Russian 232, 241, 290 (see Russian Studies).

GERMAN STUDIES

Professors E. KAHLER, V. LANGE, W. G. MOULTON, W. F. OECHLER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

German Literature 1, 2, 3, 4 Germanic Linguistics 1, 2, 3, 4

In the advanced courses in this field the work is twofold: literary and linguistic. The history of German literature from the earliest period to the present day is treated in lecture courses with collateral reading. Special topics are selected for detailed study, such as the epic and lyric poetry of the Middle High German period, the literature of the Baroque period, the age of Goethe, the drama of the nineteenth century, and contemporary literature. The courses offered in linguistics include the study of Gothic and of Old and Middle High German; they also afford an introduction to the historical and descriptive methods of language study. The seminar in German literature aims to impart the principles and methods of investigation.

Work in German studies is greatly facilitated by an exceptional library equipment whose nucleus is the Zarncke library, one of the largest collections of rare books for the study of German literature and philology ever brought to America.

Candidates with a Ph.D. major in German literature must select Germanic linguistics as one of their minors; candidates with a Ph.D. major in Germanic linguistics must select German literature as one of their minors. Candidates for advanced degrees in German Studies are expected to have an adequate knowledge of French and Latin. Inquiries concerning advanced work in German Studies and fellowships available should be addressed to the chairman, Professor Victor Lange.

For undergraduate courses which may meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* under German.

[232. *LINGUISTIC STRUCTURE OF GERMAN.* Spring term of 1953 and alternate years. Credit three hours. Prerequisites, proficiency in German and Linguistics 201. Professor MOULTON. T Th S 9. Not given in 1951–52.]

241. *HISTORY OF THE GERMAN LANGUAGE.* Fall term 1951 and alternate years. Credit three hours. Prerequisite, proficiency in German. Professor MOULTON. T Th S 9.

242. *MIDDLE HIGH GERMAN.* Spring term 1952 and alternate years. Credit three hours. Prerequisite, German 241 or German 281, 282. Professor MOULTON. T Th S 9.

[281, 282. *GOTHIC AND COMPARATIVE GERMANIC LINGUISTICS.* Throughout the year, 1952–53 and alternate years. Credit three hours. Professor MOULTON. T Th S 10. Not given in 1951–52.]

290. *SEMINAR IN GERMANIC LINGUISTICS.* Offered every term. Credit three hours. Prerequisite, German 241 or German 281, 282, or concurrent registration in one of these. Professor MOULTON. Hours to be arranged.

300. *SOCIAL AND INTELLECTUAL EVOLUTION OF MODERN GERMANY.* Fall term. Credit three hours. Visiting Professor KAHLER. M W F 12.

308. *MIDDLE HIGH GERMAN LITERATURE.* Fall term. Credit three hours. Assistant Professor OECHLER. M W F 10, or at hours to be arranged.

310. *GERMAN REFORMATION AND BAROQUE.* Fall term 1951 and alternate years. Credit three hours. Assistant Professor OECHLER. M W F 10.

316. *GERMAN PROSE FICTION FROM GOETHE TO THOMAS MANN.* Fall term. Credit three hours. Professor LANGE. M W F 11.

325. *THE GERMAN DRAMA OF THE NINETEENTH CENTURY.* Spring term. Credit three hours. Assistant Professor OECHLER. M W F 10.

332. *MODERN GERMAN LITERATURE 1870–1940.* Fall term. Credit three hours. Visiting Professor KAHLER. M W F 2.

345. *LESSING AND THE PERIOD OF ENLIGHTENMENT.* Spring term. Credit three hours. Assistant Professor OECHLER. T Th S 11.

[350. *SCHILLER.* Fall term 1950 and alternate years. Credit three hours. Visiting Professor KAHLER. M W F 2. Not given in 1951–52.]

365, 366. *GOETHE.* Throughout the year, 1951–52 and alternate years. Credit three hours a term. Professor LANGE. M W F 9.

[420. *GERMAN ROMANTICISM.* Spring term. Credit three hours. Professor ——. M W F 12. Not given in 1951–52.]

470. *PROSEMINAR IN GERMAN LITERATURE: INTRODUCTION TO METHODS.* Spring term, 1951 and alternate years. Credit two hours. Professor LANGE. One meeting a week at a time to be arranged. Required of all graduate students in German studies.

475, 476. *SEMINAR IN GERMAN LITERATURE.* Throughout the year. Credit three hours a term. Fall term, Visiting Professor KAHLER; spring term, Professor LANGE. One meeting a week at a time to be arranged.

ROMANCE STUDIES

Professors F. B. AGARD, MORRIS BISHOP, G. I. DALE, R. A. HALL, JR., B. L. RIDEOUT.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

French Linguistics 1, 2, 3, 4
French Literature 1, 2, 3, 4
Italian 1, 2, 3, 4
Romance Linguistics 1, 3, 4
Spanish Linguistics 1, 2, 3, 4
Spanish Literature 1, 2, 3, 4

The collection of French and Spanish books in the University Library is very large and offers excellent facilities for advanced work. Objects of special pride are the unrivaled Dante and Petrarch collections, the gift of the late Willard Fiske, who likewise presented the University a unique collection of Rhaeto-Romance works. Smaller collections of Portuguese, Provençal, and Catalan books are also to be found in the University Library.

The Graduate Committee on Romance Studies consists of the professors listed

above, with Professor MORRIS BISHOP as chairman. Inquiries pertaining to advanced study in this field should be addressed to the chairman.

A working knowledge of Latin is especially desirable for all candidates for advanced degrees in this field. All candidates for the degree of Doctor of Philosophy must satisfy the language requirement in French and German before beginning to earn the fourth term of residence credit. A graduate student in Romance studies should have completed some formal course of study in the language and literature of the language which he intends to select as his major subject, and should have adequate preparation for advanced work in his minor subjects.

FRENCH

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Courses 232, 233, 241, 242, 301, 302, 311–322, 361, 362.

290. *SEMINAR IN FRENCH LINGUISTICS.* Offered in accordance with student needs. Credit three hours a term. Hours to be arranged. Professor HALL.

375, 376. *MODERN FRENCH SEMINAR.* Throughout the year. Credit two hours a term. Professor BISHOP.

ITALIAN

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Courses 301, 302, 307, 308, 315, 316.

290. *SEMINAR IN ITALIAN LINGUISTICS.* Offered in accordance with student needs. Credit three hours a term. Hours to be arranged. Professor HALL.

SPANISH

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Courses 232, 241, 242, 301, 302, 303, 304, 311, 312, 321, 322, 324.

290. *SEMINAR IN IBERO-ROMANCE LINGUISTICS.* Offered in accordance with student needs. Credit three hours a term. Hours to be arranged. Associate Professor AGARD.

[375, 376. *OLD SPANISH.* Not given in 1951–52.]

381, 382. *LOPE DE VEGA.* Throughout the year. Credit two hours a term. Hours to be arranged. Professor DALE.

[385, 386. *THE PICARESQUE NOVEL.* Not given in 1951–52.]

ROMANCE LINGUISTICS

281, 282. *THE COMPARATIVE STUDY OF THE ROMANCE LANGUAGES.* Throughout the year. Credit three hours a term. Prerequisite, Linguistics 201–202, taken either previously or concurrently. Hours to be arranged. Professor HALL.

290. *SEMINAR IN ROMANCE LINGUISTICS.* Offered in accordance with student needs. Credit three hours a term. Hours to be arranged. Professor HALL.

RUSSIAN STUDIES

Professors G. H. FAIRBANKS, VLADIMIR NABOKOV.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Russian Literature 1, 2, 3, 4

Slavic Linguistics 1, 2, 3, 4

232. *THE LINGUISTIC STRUCTURE OF RUSSIAN.* Spring term. Credit three semester hours. Prerequisite, proficiency in Russian and Linguistics 201. M W F 2. Associate Professor FAIRBANKS.

241. *HISTORY OF THE RUSSIAN LANGUAGE.* Fall term. Credit three semester hours. Prerequisite, proficiency in Russian. M W F 2. Associate Professor FAIRBANKS.

290. *SEMINAR IN SLAVIC LINGUISTICS.* Offered in accordance with student needs. Credit three semester hours a term. Hours to be arranged. Associate Professor FAIRBANKS.

301, 302. *SURVEY OF RUSSIAN LITERATURE.* Throughout the year. Credit three semester hours a term. M W F 12. Associate Professor NABOKOV.

311, 312. *RENAISSANCE OF RUSSIAN POETRY.* Throughout the year. Credit three semester hours a term. Prerequisite, Russian 302 or consent of the instructor. Hours to be arranged. Associate Professor NABOKOV.

SPEECH AND DRAMA

Professors A. M. DRUMMOND, H. A. WICHELNS, HARRY CAPLAN, W. H. STAINTON, C. K. THOMAS, H. D. ALBRIGHT, C. C. ARNOLD.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Division of Rhetoric and Public Speaking

Rhetoric and Public Speaking 1, 2, 4
Principles of Public Address 3, 4
History of Public Address 3, 4
Classical Rhetoric 3, 4
Medieval Rhetoric 3, 4

Division of Dramatic Production

Drama and the Theatre 1
Dramatic Production 2, 3, 4
Playwriting 2, 3, 4
Theatre Techniques 3, 4

Division of Phonetics: Speech and Phonetics 2, 3, 4

The chief aim of graduate work in rhetoric and in dramatic production is to develop competent investigators and teachers for colleges and universities. In many cases, the work will require more than the minimum periods of residence. Ordinarily, residence in this university during two academic years will be necessary for the attainment of the doctorate.

Properly qualified students may select speech training and phonetics as a major subject for the Master's degree, as a minor subject for either degree.

Candidates for the Doctor's degree whose major interest is in rhetoric, that is, in the principles, history, and criticism of public address, will usually chose one minor subject from the field of literary history and criticism or from that of the social sciences.

Candidates for the Doctor's degree whose major interest is in drama and the theatre will be required to take dramatic literature as a minor subject, unless they have already pursued systematic study in dramatic literature, and such candidates must expect to be in residence two years and one summer beyond the requirements for the Master's degree. If preparing for general teaching, candidates will be advised to take additional courses in public speaking and speech training.

Candidates for the Master's degree in dramatic production will require at least one academic year and one summer session of residence.

The degree of Master of Fine Arts for study in drama will be granted to candidates showing special aptitude in the practical phases of dramatic production or playwriting. Their program must include suitable studies in related fine arts; two years of residence will normally be required; and a major practical project in the second year will be the thesis (see pp. 46–47 of this Announcement).

Opportunities for theatre practice of which students will be expected to avail themselves are afforded by various branches of THE CORNELL UNIVERSITY THEATRE.

For undergraduate courses which often meet the needs of the graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Speech and Drama, Courses 101, 102, 111, 131, 141, 175, 209. Preregistration is required for these courses.

205. *DISCUSSION.* Either term. Credit three hours. Assistant Professor ARNOLD. Fall term: M W F 10. Spring term: M W F 10 or T Th S 10. Preregistration required.

213, 214. *ARGUMENT.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. M W F 10. Preregistration required.

221. *FORMS OF PUBLIC ADDRESS.* Fall term. Credit three hours. Assistant Professor ARNOLD. T Th S 11.

[227. *ORATORY AS A LITERARY FORM.* Credit three hours. Professor WICHELNS. Not offered in 1951–52.]

241. *PUBLIC OPINION AND THE METHOD OF ARGUMENT.* Spring term. Credit three hours. Assistant Professor ARNOLD. T Th S 11.

[275, 276. *HISTORY OF PUBLIC ADDRESS.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. Not offered in 1951–52.]

281, 282. *BRITISH RHETORIC AND ORATORY.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. T 2–4:30.

[283, 284. *AMERICAN RHETORIC AND ORATORY.* Fall and spring terms. Credit three hours a term. Assistant Professor ARNOLD. Not offered in 1951–52.]

[287, 288. *THEORIES OF PUBLIC ADDRESS.* Fall and spring terms. Credit three hours a term. Assistant Professor ARNOLD. Not offered in 1951–52.]

[291, 292. *RHETORICAL CRITICISM.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. Not offered in 1951–52.]

[295, 296. *PHILOSOPHY OF RHETORIC.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. Not offered in 1951–52.]

[*SEMINAR IN CLASSICAL RHETORIC.* Professor CAPLAN.]

333. *ENGLISH PHONETICS.* Fall term. Credit three hours. Professor THOMAS. M W F 12.

[334. *PRINCIPLES OF PHONETICS.* Spring term. Credit three hours. Professor THOMAS. Not offered in 1951–52.]

336. *REGIONAL AND HISTORICAL PHONETICS.* Spring term. Credit three hours. Professor THOMAS. M W F 12.

[341, 342. *STRUCTURE AND FUNCTIONING OF THE SPEECH MECHANISM.* Fall and spring terms. Credit three hours a term. Not offered in 1951–52.]

351, 352. *PRINCIPLES OF SPEECH CORRECTION.* Fall and spring terms. Credit three hours a term. Mr. THOMAS. T Th S 9.

353, 354. *PRINCIPLES OF SPEECH CORRECTION.* Fall and spring terms. Credit three hours a term. Prerequisite, Course 352. Professor THOMAS. Hours to be arranged.

381, 382. *SPEECH TRAINING.* Throughout the year. Credit two hours a term. Professor THOMAS. Hours to be arranged.

401. *DRAMATIC PRODUCTION: DIRECTION.* Fall term. Credit three hours. Associate Professor STAINTON. M W F 11. Prerequisite for further work in dramatic production.

405. *ADVANCED DRAMATIC PRODUCTION: DIRECTION.* Fall term. Credit three hours. Associate Professor STAINTON. T 2–4 and hours to be arranged.

421. *ADVANCED DRAMATIC INTERPRETATION.* Spring term. Credit three hours. Associate Professor ALBRIGHT. W 2–4:30. Preregistration required.

431. *DRAMATIC PRODUCTION: STAGECRAFT.* Spring term. Credit three hours. Associate Professor STAINTON. M W 11. Laboratory, T 2–4 or as arranged.

437. *DRAMATIC PRODUCTION: STAGE LIGHTING.* Spring term. Credit three hours. Associate Professor STAINTON. T Th 12. Laboratory, Th 2–4:30.

439, 440. *THEATRE PRACTICE.* Fall and spring terms; may be entered either term. Associate Professor STAINTON and Associate Professor ALBRIGHT. Hours and credits as arranged.

451. *HISTORY OF THE THEATRE.* Spring term. Credit three hours. Professor DRUMMOND. M W F 10.

455. *AMERICAN DRAMA AND THEATRE.* Fall term. Credit three hours. Professor DRUMMOND. M W F 10.

463, 464. *PLAYWRITING.* Fall and spring terms. Credit three hours a term. Professor DRUMMOND. F 2–4:30.

475. *THEORIES OF DRAMATIC PRODUCTION.* Fall term. Credit three hours. Professor DRUMMOND. W 2–4:30.

476. *SEMINAR IN DRAMA AND THE THEATRE.* Spring term. Credit three hours. Professor DRUMMOND. W 2–4:30, or hours to be arranged.

481. *DRAMATIC ART.* Fall term. Credit three hours. Associate Professor ALBRIGHT. W 2–4:30, or hours to be arranged.

485. *MODERN THEORIES OF STAGE PRESENTATION.* Spring term. Credit three hours. Associate Professor STAINTON. W 2–4:30.

DRAMATIC LITERATURE. See English Language and Literature 369–370.

DRAMATIC STRUCTURE. See English Language and Literature 551–552, 651–652.

DRAMA AND THE THEATRE. See English Language and Literature 301–302.

MUSIC

Professors WILLIAM W. AUSTIN, WILLIAM A. CAMPBELL, DONALD J. GROUT, ROBERT L. HULL, HUNTER JOHNSON, JOHN KIRKPATRICK, ROBERT PALMER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

History of Music 2, 3, 4	Musicology 1, 2, 3, 4
Musical Composition 2, 3, 4	Theory of Music 2, 3, 4

Students interested in applied music and the musical organizations are invited to consult with the chairman of the Department. Graduate credit is not given for applied music.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Music, Courses 101, 103 and 201. For Courses 101 and 103, preregistration is required.

MUSIC THEORY

203, 204. *THEORY III. COUNTERPOINT.* Throughout the year. Credit three hours a term. Prerequisite, Music 201–202, or the equivalent. M W F 12. Mr. JOHNSON.

[207, 208. *ORCHESTRATION AND CONDUCTING.* Throughout the year. Credit three hours a term. Prerequisites, Music 101–102 and 103–104, or the equivalents. M W F 2. Messrs. CAMPBELL and JOHNSON. Not given in 1951–52.]

209, 210. *THEORY IV. COMPOSITION IN TWENTIETH-CENTURY STYLE.* Throughout the year. Credit two hours a term. Hours to be arranged. Prerequisite, Music 203–204. (Music 203–204 may be taken concurrently with Music 209–210.) Mr. JOHNSON.

[021–022. *INFORMAL STUDY.* Credit hours to be arranged. Associate Professor PALMER. Not given in 1951–52.]

023–024. *INFORMAL STUDY.* Credit hours to be arranged. Associate Professor HULL.

MUSIC HISTORY

301, 302. *HISTORY OF MUSIC.* Throughout the year. Credit three hours a term. Prerequisites, Music 101–102 and Music 201–202 (the latter may be taken concurrently with Music 301, 302). M W F 9. Associate Professor HULL.

311. *CONTEMPORARY MUSIC.* Fall term. Credit three hours. Prerequisites, Music 301–302 and Music 203–204. (The latter may be taken concurrently with Music 311.) M W F 11. Professor KIRKPATRICK.

312. *CONTEMPORARY MUSIC.* Spring term. Credit three hours. Prerequisite, Music 311. M W F 11. Professor KIRKPATRICK.

319, 320. *COLLEGIUM MUSICUM.* Throughout the year. Credit one hour a term. Prerequisite, consent of the instructor. T 2–3:40. Associate Professor HULL, assisted by members of the Department.

031, 032. *INFORMAL STUDY.* Credit hours to be arranged. Assistant Professor AUSTIN.

033, 034. *INFORMAL STUDY.* Credit hours to be arranged. Associate Professor AUSTIN.

041, 042. *INFORMAL STUDY.* Credit hours to be arranged. Associate Professor KIRKPATRICK.

ADVANCED SEMINARS

275, 276. *SEMINAR IN COMPOSITION.* Throughout the year. Credit two hours a term. Open to seniors by permission. Hours to be arranged. Mr. JOHNSON.

[277, 278. *ANALYTIC TECHNIQUE.* Throughout the year. Credit three hours a term. Prerequisite, Music 203–204, or the equivalent. M W 1–3. Associate Professor PALMER. Not given in 1951–52.]

375, 376. *INTRODUCTION TO RESEARCH.* Throughout the year. Credit two hours a term. Prerequisites, a reading knowledge of French and German and an elementary knowledge of music theory and general music history. M 10–12. Associate Professor AUSTIN.

377, 378. *SEMINAR IN MUSICOLOGY.* Throughout the year. Credit two hours a term. W 10–12. Associate Professor AUSTIN. The general subject for 1951–52 will be "A Comparative Study of J. S. Bach and Seventeenth-Century Italian Composers."

SUSAN LINN SAGE SCHOOL OF PHILOSOPHY

Professors MAX BLACK, STUART M. BROWN, JR., E. A. BURTT, NORMAN MALCOLM, ARTHUR E. MURPHY, HAROLD R. SMART, and GREGORY VLASTOS; *Dr.* Willis Doney.

The Susan Linn Sage School of Philosophy was founded through the generosity of the late Henry W. Sage, who endowed the Susan Linn Sage Professorship and gave in addition $200,000 to provide permanently for instruction and research in philosophy.

The Philosophical Review, supported by the University and issued under the auspices of the Sage School, is a quarterly journal devoted to the interests of philosophy, including logic, metaphysics, ethics, aesthetics, the history of philosophy, and the philosophy of religion. By the terms of its establishment, *The Review* is an absolutely free organ of philosophical scholarship, not devoted to the propagation of any doctrine. The *Cornell Studies in Philosophy* is a series of monograph studies, published from time to time under the editorial supervision of the professors of the School. They offer a channel for the publication of studies begun as dissertations for the doctorate or of other research. Seventeen monographs have been issued.

The instruction offered to graduate students presupposes such undergraduate courses in the subject as would be taken by a student in the College of Arts and Sciences of Cornell University who had elected philosophy as a major subject. Those who have not had equivalent preparation are expected to make up their deficiencies outside the work required for an advanced degree.

The Sage School provides opportunity for advanced study to two classes of graduate students: (1) those whose chief branch of research is in allied fields but who desire to supplement this with a minor in philosophy; (2) those whose major interest is in some branch of philosophy.

1. Graduate students having a major interest in literature or the arts, in history or social studies, or in mathematics or a branch of experimental science are permitted to choose a minor in philosophy with such emphasis as best suits their needs. For such students the School endeavors to outline a plan of philosophical study (in courses or directed reading) which will form a natural supplement to their field of research.

2. Students whose major interest is in philosophy are required (a) to gain a general knowledge of the whole subject including its history, and (b) to select some aspect or subdivision of it for intensive study and research. Candidates for the doctorate are required, and other graduate students are encouraged, to choose one minor in a subject other than philosophy.

The Graduate Prize in Philosophy. The Graduate Prize in Philosophy has an annual value of about $25 and is open for competition to all students registered in the Graduate School of Cornell University. The prize is awarded to the graduate student who submits the best paper embodying the results of research in the field of philosophy. The subject of the paper may be historical or critical or constructive. It may be concerned either with problems of pure philosophy or with the philosophical bearing of the concepts and methods of the sciences. Papers submitted in competition must be deposited in the office of the Dean of the Graduate School on or before the first of May. Each paper is to be typewritten and must bear a fictitious signature and be accompanied by the name of the

writer in a sealed envelope. The prize will be awarded by a committee appointed by the President of the University. A copy of the successful paper is to be deposited in the University Library.

For fellowships in Philosophy see page 42.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Aesthetics 1, 2, 3, 4
Epistemology 1, 2, 3, 4
Ethics 1, 2, 3, 4
History of Philosophy 1, 2, 3, 4
Logic 1, 2, 3, 4
Metaphysics 1, 2, 3, 4
Philosophy 4
Philosophy of Religion 1, 2, 3, 4
Political Philosophy 1, 2, 3, 4

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Philosophy, Courses 301–302, 312, 313, 321, 322, 323, 324, 325–326, 327.

424. *PHILOSOPHY OF SCIENCE.* Spring term. Time of meeting and instructor to be announced.

425. *ETHICAL THEORY.* Fall term. Associate Professor BROWN. M W F 2. Topic for 1951–52: Christian ethics; the ethical theories of Augustine, Aquinas, Luther, Calvin, Joseph Butler, and Nygren.

[427. *RECENT PHILOSOPHY (1890–1940).* Fall term. Professor MURPHY. Not given in 1951–52.]

[431. *SEVENTEENTH-CENTURY RATIONALISM.* Fall term. Dr. DONEY. Not given in 1951–52.]

[434. *NINETEENTH-CENTURY PHILOSOPHY.* Spring term. Associate Professor SMART. Not given in 1951–52.]

481. *AESTHETICS: ADVANCED COURSE.* Spring term. Associate Professor SMART. T Th S 11.

485. *PHILOSOPHY OF RELIGION: ADVANCED COURSE.* Spring term. Professor BURTT. Th 2–4, or hours to be arranged. Topic for 1951–52: Existentionalism: Its Significance for Religious Philosophy.

575–576. *PLATO AND ARISTOTLE.* Fall and spring terms. Professor VLASTOS. M 3–5.

579–580. *MODERN PHILOSOPHERS.* Fall term: Locke; Professor BURTT; Th 2–4. Spring term: Berkeley and Reid; Dr. DONEY; W 3–5.

[581–582. *SEMANTICS AND LOGIC.* Fall and spring terms. Professor BLACK. Not given in 1951–52.]

[584. *SEMINAR IN POLITICAL PHILOSOPHY.* Spring term. Professor VLASTOS. Not given in 1951–52.]

585. *ADVANCED ETHICS AND VALUE THEORY.* Fall term. Professor MURPHY. W 3–5. Topic for 1951–52: Can There Be a "General Theory of Value"?

[587–588. *METAPHYSICS.* Fall and spring terms. Professor BURTT. Not given in 1951–52.]

[590. *SEMINAR IN GREEK PHILOSOPHY.* Fall term. Professor VLASTOS. Not given in 1951–52.]

[592. *SEMINAR IN MODERN PHILOSOPHY.* Spring term. Not given in 1951–52.]

594. *SEMINAR IN PHILOSOPHICAL ANALYSIS.* Spring term. Associate Professor MALCOLM. Th 3–5. Topic for 1951–52: Meaning.

[595. *SEMINAR IN SEMANTICS AND LOGIC.* Fall term. Professor BLACK. Not given in 1951–52.]

039. *INFORMAL STUDY.* Members of the Department.

HISTORY AND THE SOCIAL SCIENCES

The subjects of history, economics, and government have been united since 1887 in the PRESIDENT WHITE SCHOOL OF HISTORY AND POLITICAL SCIENCE, which bears the name of the first president of the University in special recognition of the gift of his valuable collection of historical literature to the University Library.

The aims of the President White School are threefold: first, the advancement of knowledge by investigation and publication in the fields of history, economics, politics, jurisprudence, and social science; second, the training of scholars and teachers in these departments of study; third, the training of men and women for the public service, for business, and for professions such as law and journalism.

SOCIAL SCIENCE RESEARCH CENTER

The Center is an organization designed to encourage and facilitate research in all major fields of the social sciences. Its services and facilities are available for social science research by individual Faculty members and graduate students in all schools and colleges of the University, as well as for use by organized staff groups. In addition to aids in the planning and development of studies and in voluntary cooperation of research efforts, the Center supplies technical, statistical, and clerical services by appropriate arrangement with the director and staff of specific projects. The two main objectives of the organization are to encourage basic research advances by means of technical and financial aids and to provide practical research training.

Projects currently sponsored or assisted by the Center deal with problems of interest to each social science discipline. A major theme of the present research program is the study of social change and of the impact of technology and economic change upon modern societies, both in the United States and in several foreign areas.

A number of opportunities for training through participation in studies sponsored by the Center are available to graduate students who qualify for research assistantships or special employment arrangements. Normally each Center study provides one or more opportunities of this kind. Arrangements for such research experience are made through the student's Special Committee in consultation with the directors of specific studies.

ECONOMICS

Professors G. P. ADAMS, JR., MORRIS A. COPELAND, M. G. DE CHAZEAU, J. G. B. HUTCHINS, A. E. KAHN, M. S. KENDRICK, R. E. MONTGOMERY, CHANDLER MORSE, J. E. MORTON, P. M. O'LEARY, H. L. REED, E. P. REUBENS.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Economic History 1, 2, 3, 4

Economic Theory and Its History 1, 2, 3, 4

Industrial Organization, Control, and Finance 1, 2, 3, 4

International Economics 1, 2, 3, 4

Labor Economics 1, 2, 3, 4

Monetary Economics and Fiscal Policy 1, 2, 3, 4

Public Finance 1, 2, 3, 4

Economic Statistics 1, 2, 3, 4

Trade Fluctuations and the Determination of Output and Income 1, 2, 3, 4

1. All candidates for the Ph.D. in economics will be required to demonstrate competence in at least three of the above fields of study in addition to their major and minor subjects. One of these subsidiary subjects must be economic theory and its history unless that is elected as a major or minor subject.

2. All candidates for advanced degrees who elect a minor in economics will be held for work in economic theory.

3. Candidates for advanced degrees in economics may elect one minor subject from some field outside economics, or may, with the approval of their special committees, substitute subsidiary fields outside economics for one or two of those listed above.

4. Applications for fellowships and scholarships in economics should be filed with the Dean of the Graduate School prior to March 1. Applications for teaching fellowships, however, should be made directly to the chairman of the Department of Economics.

5. Courses and seminars. Courses in the School of Business and Public Administration, in addition to those listed below, may be taken with the approval of the Dean of the School. For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Economics. Preregistration is required for all of these.

275. *MONETARY AND BUSINESS CYCLE THEORY.* Throughout the year. Credit three hours a term. Professor REED. Hours to be arranged.

BASIC ECONOMIC STATISTICS. (I.L.R. 103) Fall term. Credit three hours. Professor MORTON. Hours to be arranged.

SEMINAR IN ECONOMIC STATISTICS. (I.L.R. 113) Spring term. Credit three hours. Professor MORTON. Hours to be arranged.

375. *PUBLIC CONTROL OF BUSINESS.* Throughout the year. Credit three hours a term. Professor DE CHAZEAU. Hours to be arranged.

475. *LABOR ECONOMICS.* Throughout the year. Credit three hours a term. Professor MONTGOMERY. Hours to be arranged.

575. *PUBLIC FINANCE.* Spring term. Credit three hours. Professor KENDRICK. Hours to be arranged.

675. *ECONOMIC HISTORY.* Throughout the year. Credit three hours a term. Professor HUTCHINS. Hours to be arranged.

775. *INTERNATIONAL ECONOMICS.* Throughout the year. Credit three hours a term. Associate Professor MORSE. Hours to be arranged.

975. *ECONOMIC THEORY.* Throughout the year. Credit three hours a term. Professor COPELAND. Hours to be arranged.

980. *HISTORY OF ECONOMIC THOUGHT.* Throughout the year. Credit three hours a term. Associate Professor ADAMS. Hours to be arranged.

GOVERNMENT

Professors HERBERT W. BRIGGS, ROBERT E. CUSHMAN, MARIO EINAUDI, CLINTON L. ROSSITER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

American Government and Institutions 1, 2, 3, 4

Constitutional Law and Relations 1, 2, 3, 4

Political Theory 1, 2, 3, 4

Comparative European Government 1, 2, 3, 4

Public Administration 1, 2, 3, 4

Students undertaking graduate work in government should possess a familiarity with the elements of political science and American and European political institutions as well as some knowledge of international relations and American and European history. It is recommended that candidates for the Ph.D. with a major in government should take at least one minor outside the Department.

The attention of students desiring to do graduate work in the various fields of public law is directed to the opportunities open to them in the Law School. The courses in that School in administrative law, constitutional law, international law, jurisprudence, municipal corporation, law of public utilities, and trade regulations may be elected by graduate students with the consent of the professors in charge. (See *Announcement of the Law School.)* The members of the Faculty of the Law School are willing to cooperate in directing the researches of students in their several fields and to serve as members of the Special Committees of such students.

AMERICAN GOVERNMENT AND INSTITUTIONS

213. *CONGRESS: ORGANIZATION AND METHODS OF WORK.* Fall term. Credit three hours. M W F 2.

216. *THE AMERICAN PRESIDENCY.* Spring term. Credit three hours. Prerequisite, Government 101. M W F 11. Associate Professor ROSSITER.

218. *AMERICAN POLITICAL PARTIES.* Spring term. Credit three hours. Prerequisite, Government 101. M W F 2. Associate Professor ROSSITER.

231. *PUBLIC ADMINISTRATION.* Fall term. Credit three hours. M W F 10.

235. *AMERICAN POLITICAL AND CONSTITUTIONAL THEORY.* Fall term. Credit three hours. Prerequisite, Government 101 or History 151–152. M W F 11. Associate Professor ROSSITER.

241. *CONSTITUTIONAL LAW: THE AMERICAN FEDERAL SYSTEM.* Fall term. Credit three hours. Prerequisite, Government 101 or the consent of the instructor. T Th S 11. Professor CUSHMAN.

242. *CONSTITUTIONAL LAW: FUNDAMENTAL RIGHTS AND IMMUNITIES.* Spring term. Credit three hours. Prerequisite, Government 101 or the consent of the instructor. T Th S 11. Professor CUSHMAN.

275–276. *SEMINAR IN CONSTITUTIONAL PROBLEMS.* Throughout the year. Credit two hours a term. Hours to be arranged. Professor CUSHMAN.

[286. *SEMINAR IN PUBLIC ADMINISTRATION.* Spring term. Credit two hours. Hours to be arranged. Not offered in 1952.]

295–296. *SEMINAR IN AMERICAN POLITICAL THEORY AND INSTITUTIONS.* Throughout the year. Credit three hours a term. Open to graduate students and qualified seniors. Hours to be arranged. Associate Professor ROSSITER.

COMPARATIVE GOVERNMENT AND POLITICAL THEORY

[311. *CONSTITUTIONAL GOVERNMENT OF EUROPE.* Fall term. Credit three hours. T Th S 9. Professor EINAUDI. Not offered in 1951–52.]

[321. *DEVELOPMENT OF MODERN POLITICAL THOUGHT.* Fall term. Credit three hours. T Th S 10. Professor EINAUDI. Not offered in 1951–52.]

322. *CONTEMPORARY POLITICAL THOUGHT.* Spring term. Credit three hours. T Th S 10. Professor EINAUDI.

[331. *PUBLIC CONTROL OF ECONOMIC LIFE.* Fall term. Credit three hours. T Th S 9. Professor EINAUDI. Not offered in 1951–52.]

[375–376. *SEMINAR IN POLITICAL THEORY.* Throughout the year. Credit three hours a term. Hours to be arranged. Preregistration required. Professor EINAUDI. Not offered in 1951–52.]

[385–386. *SEMINAR IN COMPARATIVE CONSTITUTIONAL LAW.* Throughout the year. Credit three hours a term. Hours to be arranged. Preregistration required. Professor EINAUDI. Not offered in 1951–52.]

INTERNATIONAL RELATIONS

[411. *INTERNATIONAL POLITICS.* Fall term. Credit three hours. M W F 9. Professor BRIGGS. Not offered in 1951–52.]

414. *INTERNATIONAL ORGANIZATION.* Spring term. Credit three hours. M W F 9. Professor BRIGGS.

417. *THE FAR EASTERN POLICY OF THE UNITED STATES.* Fall term. Credit three hours. M W F 9. Professor BRIGGS.

441, 442. *INTERNATIONAL LAW.* Throughout the year. Credit three hours a term. M W F 12. Professor BRIGGS.

475–476. *SEMINAR IN INTERNATIONAL LAW AND INTERNATIONAL ORGANIZATION.* Throughout the year. Credit two hours a term. Hours to be arranged. Professor BRIGGS.

HISTORY

Professors KNIGHT BIGGERSTAFF, E. W. FOX, P. W. GATES, H. E. GUERLAC, M. L. W. LAISTNER, F. G. MARCHAM, C. P. NETTELS, CARL STEPHENSON, MARC SZEFTEL.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

American History 1, 2, 3, 4
Ancient History 1, 2, 3, 4
Chinese History 1, 2, 3, 4
English History 1, 2, 3, 4
History of Science 1, 2, 3, 4
Medieval History 1, 2, 3, 4
Modern European History 1, 2, 3, 4
Slavic History 1, 2, 3, 4

For graduate work in history a student should have a general knowledge of history, government, and other social studies. He should be able to read French, German, and any other foreign language required for work in his special field. For major work in ancient history the student needs a reading knowledge of both Greek and Latin; for major work in medieval history a reading knowledge of Latin; for major work in Chinese history a reading knowledge of Chinese; for major work in Slavic history a reading knowledge of Russian. Such linguistic training should preferably be obtained by the student during his undergraduate years, but deficiencies can be made up after admission to the Graduate School.

The University Library contains a number of special collections that are notably strong. Among these are the President White Library of European History with its emphasis upon the French Revolution and science and warfare, the Eisenlohr collection on the history of Egypt, the Anthon collection on the Graeco-Roman world, the Fiske Collections on Dante, Petrarch, and Iceland, the Goldwin Smith collection on English history, and the Wason collection on China and the Chinese. The Collection of Regional History has brought together rich manuscript and newspaper materials for the study of American economic and social history. Mention should also be made of the libraries of the College of Agriculture and the Law School which include much additional material relating to American and English history.

There are several assistantships in history which are generally awarded to

advanced graduate students. Competition for the Moses Coit Tyler prize for an outstanding original study in American history and literature is open to graduate students.

For undergraduate courses at the beginning level which may be useful to graduate students see the *Announcement of the College of Arts and Sciences*, Department of History, Courses 101–102, 103–104, 107–108, 115–116, 147–148, 151–152, 165–166.

Persons applying for admission to the Graduate School for work in history should take the aptitude and profile tests of the Graduate Record Examination.

The Department of History regularly schedules written examinations in French and German in the first week of October and the second week in May.

AMERICAN HISTORY

Professors P. W. GATES, C. P. NETTELS.

711. *AMERICAN COLONIAL HISTORY TO 1763.* Fall term. M W F 1. Professor NETTELS.

712. *THE AGE OF WASHINGTON. 1763–1800.* Spring term. M W F 1. Professor NETTELS.

[717. *AMERICAN BIOGRAPHY.* Fall term. M W F 1. Professor NETTELS. Not offered in 1951–52.]

[721–722. *AMERICAN HISTORY: HISTORY OF THE WEST.* Fall and spring term. M W F 12. Professor GATES. Not offered in 1951–52.]

725–726. *RECENT AMERICAN HISTORY.* Throughout the year. M W F 12. Professor GATES.

775–776. *SEMINAR IN AMERICAN HISTORY.* One or two terms during the year. Hours to be arranged. Professor NETTELS.

781–782. *SEMINAR IN AMERICAN HISTORY.* Throughout the year. Hours to be arranged. Professor GATES.

ANCIENT HISTORY

Professor M. L. W. LAISTNER.

211. *GREEK HISTORY, 500–323 B.C.* Fall term. M W F 11.

[212. *THE HELLENISTIC AGE.* Fall term. M W F 11. Not offered in 1951–52.]

[213. *THE ROMAN REPUBLIC, 133–30 B.C.* Spring term. M W F 11. Not offered in 1951–52.]

214. *THE ROMAN EMPIRE, 30 B.C.–180 A.D.* Spring term. M W F 11.

275–276. *SEMINAR IN GREEK AND ROMAN HISTORIOGRAPHY.* Throughout the year. T 2–4.

[277–278. *SEMINAR IN ROMAN HISTORICAL INSCRIPTIONS.* Not offered in 1951–52.]

CHINESE HISTORY

Professor KNIGHT BIGGERSTAFF.

161–162. *HISTORY OF CHINESE CIVILIZATION: TO THE PRESENT.* Fall and spring terms. M W F 12. Credit three hours.

811. *MODERNIZATION OF CHINA: 1842–1911.* Fall term. M 2–4. Credit two hours. Prerequisite, History 162 or consent of the instructor.

812. *MODERNIZATION OF CHINA: SINCE 1911.* Spring term. M 2–4. Credit two hours. Prerequisite, History 162 or consent of the instructor.

875–876. *SEMINAR IN MODERN CHINESE HISTORY.* Throughout the year. Hours to be arranged.

See related courses under FAR EASTERN STUDIES, page 48.

ENGLISH HISTORY

Professor F. G. MARCHAM.

512. *ENGLISH CONSTITUTION HISTORY SINCE 1485.* Spring term. T Th S 11.

[515. *HISTORY OF ENGLAND UNDER THE TUDORS.* Fall term. T Th S 11. Not offered in 1951–52.]

[516. *HISTORY OF ENGLAND UNDER THE STUARTS.* Spring term. T Th S 11. Not offered in 1951–52.]

517. *HISTORY OF ENGLAND IN THE NINETEENTH CENTURY.* Fall term. T Th S 11.

[518. *HISTORY OF ENGLAND IN THE TWENTIETH CENTURY.* Fall term. T Th S 11. Not offered in 1951–52.]

575–576. *SEMINAR IN TUDOR AND STUART HISTORY.* Fall and spring terms.

MEDIEVAL HISTORY

Professor CARL STEPHENSON.

310. *MEDIEVAL SOCIETY, LEARNING, AND EDUCATION.* Spring term. Hours to be arranged. Credit three hours a term.

376. *SEMINAR IN MEDIEVAL HISTORY.* Spring term. Hours to be arranged.

511. *ENGLISH CONSTITUTIONAL HISTORY TO 1485.* Fall term. M W F 2.

MODERN EUROPEAN HISTORY

Professors E. W. FOX, H. E. GUERLAC.

[421. *THE EUROPEAN REVOLUTION, 1789–1848.* Fall term. W F 2:00–3:30. Professor Fox. Not offered in 1951–52.]

423. *MODERNIZATION OF EUROPE.* Fall term. M F 2:00–3:30. Professor Fox.

[424. *EVOLUTION OF THE FOURTH FRENCH REPUBLIC.* Spring term. W F 2:00–3:30. Professor Fox. Not offered in 1951–52.]

[426. *ORIGINS OF THE THIRD REICH.* Spring term. W F 2:00–3:30. Professor Fox. Not offered in 1951–52.]

427. *EUROPE IN THE TWENTIETH CENTURY.* Spring term. W F 2:00–3:30. Professor Fox.

481–482. *SEMINAR IN MODERN EUROPEAN HISTORY.* Hours to be arranged. Professor Fox.

916. *THE CENTURY OF THE ENLIGHTENMENT.* Spring term. M W F 9. Professor GUERLAC.

SLAVIC HISTORY

Professor MARC SZEFTEL.

[451. *HISTORY OF POLAND AND CZECHOSLOVAKIA.* Fall term. T Th 2–3:30. Not offered in 1951–52.]

[452. *HISTORY OF YUGOSLAVIA AND BULGARIA.* Spring term. T Th 2–3:30. Not offered in 1951–52.]

[455–456. *INTELLECTUAL HISTORY OF MODERN RUSSIA.* Fall and spring terms. Credit three hours a term. Prerequisite, History 147–148, or consent of the instructor. T Th 2–3:30. Not offered in 1951–52.]

457. *RUSSIAN HISTORIOGRAPHY.* Fall term. Credit three hours. Prerequisite, History 147–148 or consent of the instructor. T Th 2–3:30.

458. *KIEV RUSSIA AND MUSCOVY.* Spring term. Credit three hours. Prerequisite, History 147–148 or consent of the instructor. T Th 2–3:30.

495–496. *SEMINAR IN RUSSIAN STUDIES.* Fall and spring terms. Credit and hours to be arranged. Prerequisite, consent of Mr. SZEFTEL and other members of the Committee on Russian Studies.

HISTORY OF SCIENCE

Professor H. E. GUERLAC.

911. *ORIGINS OF MODERN SCIENCE: PHYSICAL THOUGHT.* Fall term.

[913. *ORIGINS OF MODERN SCIENCE: BIOLOGICAL THOUGHT.* Fall term. T Th 2–4. Not offered in 1951–52.]

975–976. *SEMINAR IN THE HISTORY OF SCIENCE.* Throughout the year. Hours to be arranged.

SOCIOLOGY, RURAL SOCIOLOGY, AND ANTHROPOLOGY

Professors JOHN ADAIR, W. A. ANDERSON, BLANCHE ARMSTRONG, M. L. BARRON, L. S. COTTRELL, JR., J. P. DEAN, M. E. DUTHIE, N. N. FOOTE, A. R. HOLMBERG, O. F. LARSON, A. H. LEIGHTON, J. W. MCCONNELL, E. O. MOE, M. E. OPLER, R. A. POLSON, W. W. REEDER, LAURISTON SHARP, LEO SIMMONS, E. A. SUCHMAN, H. E. THOMAS, W. F. WHYTE, R. M. WILLIAMS, JR.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Sociology 1, 2, 3, 4	Cultural Anthropology 1, 2, 3, 4
Rural Sociology 1, 2, 3, 4	Statistics 2, 3, 4

For graduate work in sociology or anthropology a student should have a general background in human biology, the social studies, and the humanities. He should also have some knowledge of the basic concepts and applications of social statistics, although deficiencies in this respect can be made up in the course of his work as a graduate student. For graduate work in rural sociology the student should have had, in addition, considerable personal experience with rural life and institutions.

It is recommended that candidates for advanced degrees in sociology, rural sociology, or anthropology should take at least one minor outside these fields.

There are several assistantships which are normally awarded to advanced graduate students. Applications should be made directly to the Department of Sociology and Anthropology or the Department of Rural Sociology.

These departments sponsor various social research programs and field projects in which graduate students may participate directly for purposes of training or research. One such large-scale current project is a community study in intergroup relations, involving an analysis of the factors affecting intergroup attitudes and behavior in a near-by industrial city, a community offering the graduate student a field laboratory for many different kinds of community research. Another is a combined program of instruction and research on the modernization of non-industrialized areas. In connection with this applied anthropology program, con-

tinuing field research projects have been initiated in the American Southwest, South America, India, and Southeast Asia to study the effects of the introduction of modern technology in underdeveloped regions. These and other research programs are carried on under the auspices of the Cornell Social Science Research Center, which is described elsewhere in this Announcement. One of the functions of the Research Center is to train graduate students in research methods by permitting them to work on established, active research projects. In rural sociology, a wide range of studies is also being conducted as a research program under the Agricultural Experiment Station of Cornell University. Currently, graduate students are working on experiment station projects in social participation of farm families, values in rural living, rural leadership, rural health, and two experiments in community development.

The requirements for the Doctor's degree in the approved major and minor fields in sociology, rural sociology, and anthropology are listed below.The major requirements for the M.A. or M.S. degrees correspond generally to the minor requirements for the Doctor's degree. (For Social Psychology, see Psychology.)

General Sociology. When offered as a major: (1) a thorough knowledge of the field of sociological theory and its history; (2) a thorough knowledge of the methodology of sociological research; and (3) a detailed knowledge of at least three subfields in sociology, such as cultural anthropology, social psychology, the family, educational sociology, rural sociology, urban sociology, social pathology, criminology, population, statistics.

When offered as a minor: a general knowledge of part (1) of the above requirement and a satisfactory knowledge of one or two subfields.

Cultural Anthropology. When offered as a major: (1) a thorough knowledge of the history of anthropology and of anthropological theory and method; (2) familiarity with the major culture areas of the world; (3) a detailed knowledge of the ethnology of at least one such area; (4) a grasp of the principles of linguistics and of physical anthropology, and familiarity with the most important findings of archaeology.

When offered as a minor: parts (1) and (2) of the above requirement.

Rural Sociology. When offered as a major: (1) a thorough knowledge of the field of sociological theory and its history; (2) a thorough knowledge of the methodology of sociological research; (3) a thorough knowledge of rural sociology and of the research in this field; and (4) a detailed knowledge of at least three subfields in sociology, such as cultural anthropology, social psychology, the family, educational sociology, rural sociology, urban sociology, social pathology, criminology, population, statistics.

When offered as a minor; a general knowledge of parts (1) and (3) of the above requirement and a satisfactory knowledge of one other subfield under part (4).

Statistics. When offered as a minor for the Ph.D. degree: (1) completion of an approved sequence of courses; (2) completion of a research project which demonstrates that the candidate is able to select methods appropriate to the problems and to employ advanced statistical methods.

GENERAL SOCIOLOGY

The following courses are offered in the Department of Sociology and Anthropology unless otherwise noted.

201. *INTRODUCTION TO RESEARCH METHODS.* Fall term. Credit three hours. Associate Professor Suchman. M W F 10.

202. *ANALYSIS AND INTERPRETATION OF SOCIAL DATA.* Spring term.

Credit three hours. Prerequisite, Statistics I or the equivalent. Associate Professor SUCHMAN. M W F 10.

[275–276. *SEMINAR: RESEARCH METHODS IN SOCIOLOGY AND ANTHROPOLOGY.* Throughout the year. Credit two hours a term. Open to upperclass majors and graduate students in sociology and anthropology. Assistant Professor HOLMBERG and Staff. W 4–6. Not given in 1951–52.]

277. *SEMINAR: CURRENT RESEARCH PROJECTS.* Throughout the year. Credit two hours a term. Prerequisite, consent of instructor. Staff. W 4–6.

301. *SOCIAL PSYCHOLOGY: INTERPERSONAL BEHAVIOR.* Fall term. Credit three hours. Prerequisite, one course in sociology and anthropology and one course in psychology. Assistant Professor FOOTE. M W F 9.

302. *SOCIAL PSYCHOLOGY: GROUP DYNAMICS.* Spring term. Credit three hours. Prerequisite, one course in sociology and anthropology and one course in psychology. Assistant Professor FOOTE. M W F 9.

[310. *THE FAMILY.* Spring term. Credit three hours. Not given in 1951–52.]

311. *PUBLIC OPINION.* Fall term. Credit three hours. Associate Professor SUCHMAN. M W F 11.

[314. *COLLECTIVE BEHAVIOR AND SOCIAL MOVEMENTS.* Spring term. Credit three hours. Not given in 1951–52.]

[320. *POLITICAL SOCIOLOGY.* Fall term. Credit three hours. Not given in 1951–52.]

HUMAN RELATIONS. (See Industrial and Labor Relations 220.)

PRINCIPLES OF HUMAN RELATIONS. (See Industrial and Labor Relations 320.)

[375. *SEMINAR: SOCIAL PSYCHOLOGY.* Spring term. Credit two hours. Not given in 1951–52.]

[376. *SEMINAR: PROPAGANDA.* Spring term. Credit two hours. Associate Professor SUCHMAN. Not given in 1951–52.]

385. *SEMINAR: GROUP RELATIONS.* Spring term. Credit two hours. Professor WILLIAMS. T 2–4.

431. *STRUCTURE AND FUNCTIONING OF AMERICAN SOCIETY. I.* Fall term. Credit three hours. Prerequisite, Sociology and Anthropology 101 or equivalent. Professor WILLIAMS. T Th S 9.

432. *STRUCTURE AND FUNCTIONING OF AMERICAN SOCIETY. II.* Spring term. Credit three hours. Prerequisite, Sociology and Anthropology 101 or equivalent. Professor WILLIAMS. T Th S 9.

433. *AMERICAN ECONOMIC CLASSES.* Fall term. Credit three hours. Open to upperclassmen and graduate students. Assistant Professor FOOTE. T Th S 8.

[477–478. *SEMINAR: THE URBAN COMMUNITY.* Throughout the year. Credit two hours a term. Prerequisite, consent of instructor. Assistant Professor DEAN. Not given in 1951–52.]

[485. *SEMINAR: FOREIGN INTERPRETATIONS OF AMERICAN SOCIETY.* Fall term. Credit two hours. Prerequisite, consent of instructor. Assistant Professor BARRON. Not given in 1951–52.]

[510. *POPULATION PROBLEMS.* Fall term. Credit three hours. Assistant Professor BARRON. Not given in 1951–52.]

520. *PROBLEMS IN MINORITY GROUP RELATIONS.* Spring term. Credit three hours. Prerequisite, Sociology and Anthropology 101 or the equivalent. Assistant Professor BARRON. T Th S 10.

530. *DELINQUENCY AND CRIME.* Fall term. Credit three hours. Assistant Professor BARRON. T Th S 10.

550. *SOCIAL PLANNING.* Spring term. Credit three hours. Open to upperclassmen and graduate students. Assistant Professor FOOTE. T Th S 8.

[576. *SEMINAR: SOCIAL CHANGE AND SOCIAL PLANNING.* Spring term. Credit two hours. Not given in 1951–52.]

[585. *SEMINAR: PROBLEMS OF OLD AGE.* Fall term. Credit two hours. Assistant Professor BARRON. Not given in 1951–52.]

SOCIOLOGICAL THEORY (See Rural Sociology 207.)

SYSTEMATIC SOCIOLOGY. (See Rural Sociology 208.)

875. *THEORY OF CULTURE AND SOCIAL ORGANIZATION.* Fall term. Credit three hours. Open to seniors and graduate students with the consent of the instructor. Professor WILLIAMS. T Th S 11.

020. *INFORMAL STUDY.* Throughout the year. Credit and hours to be arranged. Open to upperclass majors and graduate students in Sociology and Anthropology. Members of the Department Staff.

CULTURAL ANTHROPOLOGY

The following courses are offered in the Department of Sociology and Anthropology unless otherwise noted.

[603. *NATIVE CULTURES OF THE NEW WORLD: NORTH AMERICA.* Fall term. Credit three hours. Assistant Professor ADAIR. Not given in 1951–52.]

[604. *NATIVE CULTURES OF THE NEW WORLD: MIDDLE AND SOUTH AMERICA.* Spring term. Credit three hours. Assistant Professor HOLMBERG. Not given in 1951–52.]

[605. *NATIVE CULTURES OF THE PACIFIC.* Spring term. Credit two hours. Prerequisite, consent of instructor. Professor SHARP. Not given in 1951–52.]

[*PHYSICAL ANTHROPOLOGY AND HUMAN EVOLUTION.* (See Zoology 222.) Not given in 1951–52.]

609. *CULTURAL PREHISTORY.* Fall term. Credit three hours. Assistant Professor ADAIR. M W F 2–3.

611. *CULTURAL ANTHROPOLOGY.* Fall term. Credit three hours. Open to upperclassmen and graduate students. Professor OPLER. M W F 12.

612. *CULTURE AND PERSONALITY.* Spring term. Credit three hours. Open to upperclassmen and graduate students. Professor OPLER. M W F 12.

616. *CULTURAL SOURCES OF PSYCHOLOGICAL STRESS.* Spring term. Credit three hours. Dr. RAPAPORT. M W F 2–3.

INTRODUCTION TO THE SCIENTIFIC STUDY OF LANGUAGE. (See Linguistics 201–202.)

620. *COMPARATIVE SOCIAL AND POLITICAL ORGANIZATION.* Spring term. Credit three hours. M W F 11.

[622. *COMPARATIVE RELIGIOUS SYSTEMS OF NONWESTERN PEOPLES.* Fall term. Credit three hours. Professor OPLER. Not given in 1951–52.]

[624. *COMPARATIVE ECONOMIC SYSTEMS OF NONWESTERN PEOPLES.* Spring term. Credit three hours. Assistant Professor HOLMBERG. Not given in 1951–52.]

[*PRIMITIVE ART: THE ART OF EARLY SOCIETIES.* (See Fine Arts 204.) Not given in 1951–52.]

[626. *THE ARTS OF NONLITERATE MAN.* Spring term. Credit three hours. Assistant Professor ADAIR. Not given in 1951–52.]

[SEMINAR: LANGUAGE AND CULTURE. (See Linguistics 290.) Given in alternate years. Not given in 1951–52.]

[675. *SEMINAR: ANTHROPOLOGICAL THEORY.* Spring term. Credit two hours. Professor OPLER. Not given in 1951–52.]

677. *SEMINAR: CULTURE AND CULTURE CHANGE IN NORTHEAST AMERICA.* Fall term. Credit two hours. Prerequisite, consent of instructor. Professor LEIGHTON. T 10–12.

681. *SEMINAR: CULTURE AND CULTURE CHANGE IN MIDDLE AND SOUTH AMERICA.* Spring term. Credit two hours. Assistant Professor HOLMBERG. Not given in 1951–52.]

683. *SEMINAR: CULTURE AND CULTURE CHANGE IN INDIA.* Fall term. Credit two hours. Professor OPLER. T 4–6.

685. *SEMINAR: CULTURE AND CULTURE CHANGE IN SOUTHEAST ASIA.* Spring term. Credit two hours. Professor SHARP.

687. *SEMINAR: REGIONAL ANTHROPOLOGY.* Throughout the year. Credit to be arranged. Far East: Professors LEIGHTON, OPLER, and SHARP; Middle East: Professors OPLER and SHARP; North America: Assistant Professor ADAIR, Professors LEIGHTON and OPLER; Middle and South America: Assistant Professor HOLMBERG; Oceania: Professor SHARP; Africa: Assistant Professor HOLMBERG and Professor SHARP.

689. *SEMINAR: SPECIAL PROBLEMS IN ANTHROPOLOGY.* Throughout the year. Credit to be arranged. Staff.

690–691. *SEMINAR: CASE STUDIES IN APPLIED ANTHROPOLOGY.* Both terms or either term. Credit two hours a term. Prerequisite, consent of instructor. Professor SHARP and Staff. M 7:30–9:30.

692. *SEMINAR: FIELD LABORATORY IN APPLIED ANTHROPOLOGY.* Summer. Credit five hours. Prerequisite, consent of instructors. Professor LEIGHTON and Assistant Professor ADAIR.

RURAL SOCIOLOGY

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Rural Sociology, Courses 1, 12, 123, 124, 126, 128, 129, 130, 131, 133. For Course 123, preregistration is required.

The following courses are offered in the Department of Rural Sociology.

105. *ORGANIZATION METHODS.* Fall term. Credit three hours. Prerequisite Course 1, 12, or permission of instructor. Assistant Professor REEDER. T Th S 11–12:30. Warren 340. Fee for materials, $1.00.

111. *RURAL COMMUNITY ORGANIZATION.* Spring term. Credit three hours. Prerequisite, Course 1, 12, or permission of the instructor. Assistant Professor REEDER. T Th S 11–12:30. Warren 340. Fee for materials, $1.00.

132. *RURAL LEADERSHIP.* Spring term. Credit two hours. Prerequisite, permission of the instructor. Professor LARSON. Th 2–4. Warren 302.

[134. *RURAL SOCIAL PROBLEMS AND PUBLIC POLICY.* Fall term. Credit two hours. Prerequisite, permission of the instructor. Professor LARSON. T 2–4. Warren 302. Not given in 1951–52.]

135. *FARMERS' ORGANIZATIONS IN THE UNITED STATES.* Spring term.

Credit three hours. Professor ANDERSON and members of the Staff. M W F 4. Warren 302.

[207. *SOCIOLOGICAL THEORY.* Throughout the year. Credit three hours a term. Alternates with Course 208. Prerequisite, permission of instructor. Professor ANDERSON. M W F 10. Not given in 1951–52.]

208. *SYSTEMATIC SOCIOLOGY.* Throughout the year. Credit three hours a term. Given in alternate years. Prerequisite, permission of instructor. Professor ANDERSON. T Th S 10. Warren 302.

[211. *THE RURAL COMMUNITY.* Fall term. Credit two hours. Prerequisite, permission of instructor. Assistant Professor REEDER. W 2–4. Warren 302. Not given in 1951–52.]

212. *RURAL SOCIOLOGY.* Throughout the year. Fall term: credit three hours; T Th S 8. Spring term: credit two hours; T 2–4. Professor LARSON. Warren 302.

[217. *SEMINAR: THE HISTORY OF RESEARCH IN RURAL SOCIOLOGY.* Spring term. Credit three hours. Prerequisite, permission of the instructor. Professor ANDERSON. W M F 10. Warren 302. Not given in 1951–52.]

[218. *SEMINAR: APPLICATION OF SOCIOLOGY TO PROBLEMS OF RURAL SOCIETY.* Spring term. Credit two hours. Given in alternate years. Prerequisite, permission of a department staff member. Professor POLSON and members of the Staff. M 2–4. Not given in 1951–52.]

219. *SEMINAR: COMMUNITY ORGANIZATION.* Spring term. Credit two hours. Given in alternate years. Prerequisite, permission of a department staff member. Professor POLSON and members of the Staff. M 2–4. Warren 302.

220. *SEMINAR: COMPARATIVE RURAL SOCIAL LIFE.* Fall term. Credit two hours. Professor ANDERSON. M 4:10–5:50. Warren 302.

[221. *SEMINAR: RURAL SOCIAL PARTICIPATION.* Fall term. Credit three hours. Prerequisite, permission of the instructor. Professor ANDERSON. Not given in 1951–52.]

[240. *SEMINAR: PROBLEMS IN TEACHING SOCIOLOGY.* Spring term. Credit two hours. Prerequisite, permission of instructor. Assistant Professor REEDER and Staff. W 2–4. Warren 302. Not given in 1951–52.]

250. *INFORMAL STUDY IN RURAL SOCIOLOGY.* Throughout the year. Credit one to three hours each term as arranged. Prerequisite, permission of department staff member concerned. Staff.

251. *RESEARCH IN RURAL SOCIOLOGY.* Throughout the year. Hours and credit to be arranged. Staff.

STATISTICS

Courses in statistics are given in various divisions of the University. Information on the following courses will be found in the listings of the appropriate department or school.

STATISTICS I (Industrial and Labor Relations). Either term. Credit three hours.

STATISTICS II (Industrial and Labor Relations). Spring term. Credit three hours. Prerequisite, Statistics I.

ELEMENTARY MATHEMATICAL STATISTICS (Department of Mathematics). Throughout the year. Credit three hours a term.

ADVANCED MATHEMATICAL STATISTICS (Department of Mathematics).

Throughout the year. Credit three hours a term. Prerequisite, elementary mathematical statistics.

ELEMENTARY PROBABILITY (Department of Mathematics). Throughout the year. Credit three hours a term.

ADVANCED PROBABILITY (Department of Mathematics). Throughout the year. Credit three hours a term.

DESIGN OF SAMPLE SURVEYS (Industrial and Labor Relations). Fall term. Credit three hours. Prerequisite, one term of statistics.

STATISTICAL TABULATION AND COMPUTING (Industrial and Labor Relations). Spring term. Credit three hours.

SEMINAR ON SOCIAL AND ECONOMIC STATISTICS (Industrial and Labor Relations). Spring term. Credit three hours.

ANIMAL SCIENCES

Laboratory space is limited and is often overtaxed, especially in courses which admit both graduate students and undergraduates. Graduate students who desire to enroll in such courses are warned to make application for space well in advance of the beginning of instruction. This is particularly true of the second term, since the College of Agriculture holds its preregistration for undergraduates in January. Failure to arrange for laboratory space in advance will probably result in exclusion from courses.

Graduate work in Animal Sciences at Cornell University is distributed through many departments in the Colleges of Agriculture, Arts and Sciences, and Veterinary Medicine. In this Announcement little cognizance is taken of college or departmental organization. The various fields of study in which students may elect to pursue their work for the Master's or Doctor's degree are listed alphabetically. After selecting his major field the student should consult the professor in charge (who may become chairman of his special committee) as to the most appropriate minor field or fields. The requirements in each field depend largely on the previous training of the student, and the professor in charge will outline the courses of study and the nature of the thesis or essay that will be required. In each case, however, a candidate for an advanced degree will be expected to have had adequate undergraduate training in the fields in which he plans to specialize.

The laboratory and field equipment and the library facilities available to graduate students in the Animal Sciences at Cornell are those of a major university where the members of the Faculty are engaged in research. Each department has its special facilities in keeping with the nature of the research undertaken, and all enjoy a large central library as well as smaller departmental libraries. Since so many departments and buildings on the campus are involved, attention is called in the alphabetical arrangements to the location of the main office of each field of work.

In certain fields there are a limited number of temporary fellowships for special work as well as the University fellowships listed on pages 38–42 of this Announcement.

ANIMAL BREEDING AND PHYSIOLOGY

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Animal Breeding 1, 2, 3, 4 Animal Genetics 1, 2, 3, 4

Before entering graduate study in animal breeding the student should have had courses in zoology, general biology, comparative anatomy, physiology, and chemistry, and elementary courses in genetics and animal breeding. Some practical experience in animal husbandry, poultry husbandry, or plant breeding is desirable.

In the course of their graduate study, students will be expected to take certain courses in animal physiology, biochemistry, embryology, cytology, genetics, biometry, and histology. One or more of these may be selected as a minor subject.

Graduate studies in animal breeding may be taken in several departments of the University, and the student should consult the course offerings under each of these departments.

Graduate work in genetics and breeding of large animals, including physiology

of reproduction, is offered in the Department of Animal Husbandry. This work is supervised by Professors ASDELL, BRATTON, FOOTE, HANSEL, and HENDERSON.

Graduate study in animal genetics is offered in the Department of Poultry Husbandry, where work in that field is supervised by Professors HUTT, COLE, BRUCKNER, and HALL.

Courses in genetics and biological statistics are given in the Department of Plant Breeding by Professors SRB, SMITH, ATWOOD, CUSHING, FEDERER, and LIVERMORE.

ANIMAL HUSBANDRY

Professors K. L. TURK, S. A. ASDELL, J. K. LOOSLI, L. A. MAYNARD, C. M. MCCAY, J. I. MILLER, F. B. MORRISON, G. W. TRIMBERGER, J. P. WILLMAN; *Associate Professors* R. W. BRATTON, C. R. HENDERSON, J. T. REID, S. E. SMITH; *Assistant Professors* R. H. FOOTE, WM. HANSEL, L. H. SCHULTZ, J. J. WANDERSTOCK.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Animal Husbandry 1, 2, 3, 4

Animal Nutrition 1, 2, 3, 4 (See also under Animal Nutrition)

Animal Breeding 1, 2, 3, 4 (See also under Animal Breeding)

Dairy Husbandry 1, 2, 3, 4

Note: If the major for the Doctor's degree lies in one of these fields, not more than one of the other three should be selected for a minor.

For the special facilities of the Animal Husbandry Department in animal nutrition and detailed descriptions of the courses in this field see the statements under that subject.

The department is well equipped with herds and flocks of animals of the leading breeds of livestock and with modern barns adapted for experimental work. The livestock includes a herd of over three hundred dairy cattle, a herd of beef cattle, studs of draft horses, a flock of over two hundred sheep, and a herd of breeding swine. The library includes a full collection of the herd and flock registers of all of the breeds of domestic animals kept in this country, amounting to more than one thousand volumes, and affording excellent facilities in heredity and genetics.

The animals of the herds and flocks and their records provide opportunity for studying problems of nutrition, livestock feeding, breeding, and production.

Slaughter and meat laboratories are available for the study of the relation of breeding and nutrition to anatomical structure and to chemical composition and food value. The college animals are available for studies relating to the production and the processing, sale, grading, and measuring of their various products such as milk, meat, and horsepower, including animal mechanics.

To enter upon graduate study in animal production, the student should have the equivalent of the following courses: elementary feeds and feeding, elementary breeding, and the elementary production courses in dairy and beef cattle, horses, sheep, and swine.

Also, the student should have basic courses in general biology or zoology, introductory chemistry, organic chemistry, animal physiology, and genetics. In the course of their graduate study, candidates for the Doctor's degree will be expected to take training in biochemistry, physiology, genetics, biological statistics, and other related fields.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Animal Husbandry, Courses 1, 10, 20, 50, 60, 70, 80, and 90.

110 *PRINCIPLES OF ANIMAL NUTRITION.* Fall term. See Animal Nutrition.

111. *LABORATORY WORK IN ANIMAL NUTRITION.* Fall term. Laboratory course. See Animal Nutrition.

115. *ADVANCED LIVESTOCK FEEDING AND APPLIED ANIMAL NUTRITION.* Spring term. Credit two hours. Prerequisites, a course in livestock feeding and a course in animal nutrition. Professor MORRISON. Lectures and discussions, T Th 9.

120. *PROBLEMS IN ANIMAL BREEDING.* Fall term. Credit two hours. Prerequisite, Animal Husbandry 20 or Plant Breeding 101. Professor HENDERSON. T Th 11.

125. *PHYSIOLOGY OF REPRODUCTION.* Spring term. Credit two hours. Prerequisite, a course in human or veterinary physiology. Professor ASDELL. M W 10.

126. *APPLIED ANIMAL PHYSIOLOGY.* Fall term. Credit one hour. Professor ASDELL. T 9.

127. *ELEMENTARY ENDOCRINOLOGY.* Fall term. Credit two hours. Professor HANSEL. T Th 10.

150. *ADVANCED DAIRY PRODUCTION.* Spring term. Credit three hours. Prerequisite, Course 50. Professor TRIMBERGER. Lecture, T Th 11. Discussion and practice, T 2–4:30.

200. *RESEARCH.* Fall and spring terms. Hours by arrangement. Professors MORRISON, MILLER, REID, SMITH, TRIMBERGER, TURK, J. P. WILLMAN, BRATTON, HENDERSON, ASDELL, LOOSLI, MAYNARD, and MCCAY.

201. *SEMINAR IN ANIMAL HUSBANDRY.* Fall term, to be repeated in spring term. Required of all graduate students taking either a major or minor subject in Animal Husbandry. Professor TURK and departmental Staff. M 11.

[210. *SPECIAL TOPICS IN ANIMAL NUTRITION.* Spring term. See Animal Nutrition. Not given in 1951–52.]

215. *HISTORY OF NUTRITION.* Fall term. See Animal Nutrition.

219. *SEMINAR IN ANIMAL NUTRITION.* Fall term. See Animal Nutrition.

ANIMAL NUTRITION

Professors L. L. BARNES, G. F. HEUSER, F. W. HILL, J. K. LOOSLI, L. A. MAYNARD, C. M. MCCAY, F. B. MORRISON, L. C. NORRIS, M. L. SCOTT, S. E. SMITH.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Animal Nutrition 1, 2, 3, 4

(See also Food and Nutrition under HOME ECONOMICS, pp. 164–165).

To enter upon graduate study in animal nutrition as a major field the student should have had courses in general biology or zoology, introductory chemistry, analytical chemistry, organic chemistry, human or animal physiology, physics, and animal breeding or genetics. In the course of their graduate study candidates for the Doctor's degree are expected to acquire training in biochemistry, physiology, histology, physical chemistry, and biometry and are generally advised to select one of these fields as a minor.

The following courses are offered in the Departments of Animal Husbandry (A.H.) and Poultry Husbandry (P.H.) as indicated:

A.H. 10. *LIVESTOCK FEEDING.* First or second term. Three lectures and one laboratory period a week.

P.H. 110. *POULTRY NUTRITION.* Second term. Two lectures and one laboratory period a week.

A.H. 110. *PRINCIPLES OF ANIMAL NUTRITION.* Fall term. Credit three hours. Prerequisites, a course in physiology and in organic chemistry or biochemistry. Professor LOOSLI. Lectures, M W F 10.

A.H. 111. *LABORATORY IN ANIMAL NUTRITION.* Fall term. Credit three hours. Prerequisite, Quantitative Analysis. Professor MCCAY. M W F 2–4. Preregistration required.

A.H. 115. *ADVANCED LIVESTOCK FEEDING AND APPLIED ANIMAL NUTRITION.* Spring term. Credit two hours. Prerequisites, a course in livestock feeding and a course in animal nutrition. Professor MORRISON. T Th 9.

P.H. 210. *EXPERIMENTAL METHODS IN POULTRY NUTRITION.* Spring term. Credit two hours. Registration by permission. Professors NORRIS and SCOTT. Hours to be arranged.

[A.H. 210. *SPECIAL TOPICS IN ANIMAL NUTRITION.* Spring term. Credit one hour. Registration by permission. Professors LOOSLI and MCCAY. T 8. Not given in 1951–52.]

A.H. 215. *HISTORY OF NUTRITION.* Fall term. Credit one hour. Professor MCCAY. Th 4:15.

A.H. 219. *SEMINAR IN ANIMAL NUTRITION.* Fall term. Credit one hour. Registration by permission. Animal Nutrition staff. Weekly conferences, T 4:30.

BIOCHEMISTRY AND NUTRITION

Savage Hall: *Professors* SUMNER, WILLIAMS, NEAL, NELSON, RAMSTAD, DANIEL, MAYNARD, ELLIS, SOMERS; at Geneva, *Professors* D. B. HAND, F. P. BOYLE, R. W. HOLLEY, Z. I. KERTESZ, F. A. LEE, A. C. WAGENKNECHT, A. W. AVENS, D. C. CARPENTER, G. L. MACK, G. W. PEARCE, J. C. HENING, W. B. ROBINSON, J. C. MOYER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Biochemistry 1, 2, 4

101. *GENERAL BIOCHEMISTRY.* Lecture. Fall term. Credit four hours. Prerequisites, Chemistry 215 or the equivalent; and 303 and 305, or the equivalent. Lectures, M W F S 11. Savage Hall 100. Professor WILLIAMS.

102. *GENERAL BIOCHEMISTRY.* Laboratory. Fall term. Credit two hours. Prerequisite or parallel, Biochemistry 101. Laboratory, M W or T Th 2–4:20. Savage Hall 230. Professor WILLIAMS and Assistants.

130. *PRINCIPLES OF FOOD PRESERVATION.* Spring term. Credit two hours. Prerequisite, Organic Chemistry. Lectures, T Th 10. Savage Hall 145. Associate Professor RAMSTAD.

140. *SELECTED TOPICS IN FOOD BIOCHEMISTRY.* Spring term. Credit two hours. Prerequisite, Biochemistry 101. Lectures, M W 10. Savage Hall 145. Associate Professor RAMSTAD.

201. *BIOCHEMISTRY OF LIPIDS AND CARBOHYDRATES.* Spring term. Credit two hours. Prerequisite, Physical Chemistry 405 and 406, and Biochemistry 101 and 102, or the equivalent. Lectures, M W 9. Savage Hall 100. Professor SUMNER and Associate Professor NELSON.

202. *BIOCHEMISTRY OF PROTEINS AND ENZYMES.* Spring term. Credit

two hours. Prerequisite, Physical Chemistry 405 and 406 and Biochemistry 101 and 102, or the equivalent. Lectures, T Th 9. Savage Hall 100. Professor SUMNER.

203. *ADVANCED BIOCHEMISTRY.* Laboratory. Spring term. Credit three hours. Prerequisite, to accompany or follow Biochemistry 201 and 202. Registration by permission only. M W 2–5. Savage Hall 230. Professor SUMNER and Associate Professor NELSON.

210. *PLANT BIOCHEMISTRY.* Spring term. Credit two hours. Prerequisite, Biochemistry 101 and 102 or the equivalent. Given in alternate years. Lectures, T Th 11. Savage Hall 145. Associate Professor NEAL.

220. *SPECIAL TOPICS IN NUTRITION.* Spring term. Credit one hour. Primarily for graduate students. Prerequisite, a course in biochemistry and a course in nutrition. Registration by permission. T 8. Savage Hall 145. Professor MAYNARD.

290. *BIOCHEMISTRY SEMINAR.* Fall term. Credit one hour. Required of majors and minors. Open only to students who have had Courses 201, 202, or the equivalent. Registration by permission. M 4:15. Savage Hall 100. Professor SUMNER and Staff.

292. *NUTRITION SEMINAR.* Spring term. Credit one hour. Registration by permission. M 4:15. Savage Hall 100. Professor MAYNARD and Staff.

294. *FOOD BIOCHEMISTRY SEMINAR.* Fall term. Credit one hour. Registration by permission. T 4:30. Savage Hall 130. Associate Professor RAMSTAD.

CONSERVATION

Fernow Hall; *Professors* A. A. ALLEN, J. C. AYERS, D. C. CHANDLER, W. R. EADIE, C. H. GUISE, W. J. HAMILTON, JR., O. H. HEWITT, P. P. KELLOGG, R. R. MORROW, E. L. PALMER, A. M. PHILLIPS, E. C. RANEY, G. A. SWANSON, D. A. WEBSTER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Fishery Biology 1, 2, 3, 4
Forest Conservation 2, 4
Herpetology 1, 2, 3, 4
Ichthyology 1, 2, 3, 4
Mammalogy 1, 2, 3, 4
Oceanography 1, 2, 3, 4
Ornithology 1, 2, 3, 4
Vertebrate Taxonomy and Ecology 3, 4
Wildlife Management 1, 2, 3, 4

To undertake graduate study the student should be well prepared in general and vertebrate zoology and should have or must acquire a foundation in the specialized field of study which he intends to pursue. A strong background in the other natural and physical sciences is highly desirable, and a working knowledge of statistical methods is important in all fields. Staff members are available to direct graduate study during the regular University summer session, and selected summer courses are offered.

Applicants for graduate study in conservation are expected to submit Graduate Record Examination scores for the aptitude and profile tests. Applicants whose cases must be considered before the Graduate Record Examination scores are available may be recommended for admission as noncandidates pending satisfactory scores in the Graduate Record Examination.

Attention is also directed to the fields of study and courses offered in the Departments of Botany, Zoology, Entomology, and Limnology. Graduate study in Conservation Education is directed by Dr. Palmer in the School of Education under Nature Study and Science Education.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Conservation,

Courses 1, 2, 3, 4, 8, 9; Department of Entomology and Limnology, Courses 12 and 16; Department of Botany, Courses 55 and 56; and the *Announcement of the College of Arts and Sciences,* Department of Zoology, Courses 101–102, 103–104, 211–212. Preregistration is required for all.

FISHERY BIOLOGY

Fernow Hall; *Associate Professors* D. A. WEBSTER, A. M. PHILLIPS.

173. *FISHERY BIOLOGY.* Fall term. Credit three hours. Prerequisite, consent of instructor. Associate Professor WEBSTER. Lectures, M W F 12. Fernow 122.

174. *FISH CULTURE.* Spring term. Credit two hours. Prerequisite, consent of instructor. Associate Professor PHILLIPS. Lecture, M 12; laboratory, M 2–4:30.

175. *FISHERY BIOLOGY LABORATORY.* Spring term. Credit two hours. Prerequisite, Conservation 173. Limited to graduate majors and minors and qualified seniors. Associate Professor WEBSTER. T Th 1:30–5. Fernow 102.

179. *SEMINAR IN FISHERY BIOLOGY.* Fall and spring terms. Without credit. Registration by permission of instructor. Time and place to be arranged. Associate Professors WEBSTER and PHILLIPS.

STREAM POLLUTION. (See Sanitary Engineering 2531.)

FORESTRY

Fernow Hall; *Professors* C. H. GUISE, R. R. MORROW.

Graduate students, candidates for the degrees of Master of Science or Doctor of Philosophy, may elect to do work of nonprofessional character in forest conservation.

OCEANOGRAPHY

Fernow Hall; *Professor* J. C. AYERS.

Students planning to work in this field should be well grounded in biology and chemistry. Major or minor work for the Doctor's degree and major work for the Master's degree require marine experience. Arrangements can be made to provide this experience for properly qualified students.

180. *OCEANOGRAPHY.* Fall term. Credit three hours. Prerequisites, general zoology, botany, chemistry, and physics or equivalents. Assistant Professor AYERS. Lectures, T Th 10; laboratory, Th 12. Fernow 122.

181. *MARINE ECOLOGY.* Spring term. Credit three hours. Prerequisites, general zoology, chemistry, and physics, plus either invertebrate zoology or limnology. Assistant Professor AYERS. Lectures, M W F 9. Fernow 122.

ORNITHOLOGY

Fernow Hall: *Professors* A. A. ALLEN, P. P. KELLOGG.

Before registering for a major in ornithology a student must have thorough training in biology, and in the majority of cases must expect to do summer work on his problem.

126. *ADVANCED ORNITHOLOGY.* Fall term. Credit three hours. Prerequisite, Course 9 or Vertebrate Taxonomy 8. Professor ALLEN. Lecture and laboratory, T Th 2–5. Fernow 210. Preregistration required.

131. *TECHNIQUES IN ORNITHOLOGY.* Fall term. Credit three hours. Pre-

requisite, Courses 8 and 9, Botany 1, and Entomology 12, or consent of instructor. Associate Professor KELLOGG. Lecture and laboratory, M W 2–5. Fernow 210.

133. *BIRD SPECIATION AND MUSEUM METHODS IN ORNITHOLOGY.* Spring term. Credit three hours. Limited to graduate students. Professor ALLEN and Mr. PARKES. Lecture and laboratory, S 8–1. Fernow 308. Preregistration required. Prerequisite, Courses 8, 9, 126, and 131, or permission to register.

136. *ORNITHOLOGY SEMINAR.* Throughout the year. M 7:30–9 P.M. Fernow 122. Required of all graduate students in Ornithology.

VERTEBRATE TAXONOMY AND ECOLOGY

Fernow Hall: *Professors* W. J. HAMILTON, JR., W. R. EADIE, E. C. RANEY.

22. *ICHTHYOLOGY.* Spring term. Credit three hours. Prerequisite, Conservation 8 or consent of instructor. Associate Professor RANEY. Lectures, T Th 8. Fernow 122. Laboratory, F 2–4:30. Fernow 14. Preregistration required.

23. *HERPETOLOGY.* Spring term. Credit two hours. Prerequisite, Conservation 8. Professor HAMILTON and Associate Professor RANEY. Lectures and demonstrations, T Th 9. Fernow 122. Several field trips to be arranged.

Structure and classification of amphibia and reptiles; their characteristics, relationships and bionomics.

25. *MAMMALOGY.* Fall term. Credit three hours.. Prerequisite, Conservation 8 or consent of instructor. Professor HAMILTON. Lectures, T Th 8. Fernow 122. Laboratory, F 2–4:30 or S 8–10:30. Fernow 14. Preregistration required.

112. *LITERATURE OF ECONOMIC ZOOLOGY, CONSERVATION, AND ECOLOGY.* Spring term. Credit one hour. Professor HAMILTON, and Associate Professors EADIE and RANEY. W 9 A.M. Fernow 122.

122. *ADVANCED ICHTHYOLOGY.* Fall term. Credit one or two hours. Prerequisites, Conservation 8, 22, Elementary Statistics, permission of instructor. Associate Professor RANEY. Hours to be arranged. Fernow 14.

WILDLIFE MANAGEMENT

Fernow Hall: *Professor* SWANSON, *Associate Professor* EADIE, *Assistant Professor* HEWITT.

102. *PRINCIPLES OF WILDLIFE MANAGEMENT.* Fall term. Credit three hours. Prerequisite, consent of instructor. Assistant Professor HEWITT. Lectures, M W F 10 and two field trips to be arranged. Fernow 122.

103. *WILDLIFE MANAGEMENT METHODS.* Spring term. Credit three hours. Prerequisite, consent of instructor. Assistant Professor HEWITT. Lecture, F 11; laboratory, S 8–1. Several all-day field trips. Fernow 212.

110. *ECONOMIC ZOOLOGY.* Fall term. Credit one hour. Prerequisite, consent of instructor. Associate Professor EADIE. F 8. Fernow 122.

CONSERVATION, ALL BRANCHES

400–407. *RESEARCH PROBLEMS.* Either term. Credit and hours to be arranged. Problems may be undertaken in any of the fields of study in the Department, but adequate preparation in the specialized field and consent of the instructor are prerequisites. Fernow Hall.

400. *FISHERY BIOLOGY.* Associate Professors WEBSTER and PHILLIPS.

401. *HERPETOLOGY.* Professor HAMILTON and Associate Professor RANEY.

402. *ICHTHYOLOGY.* Associate Professor RANEY.

403. *MAMMALOGY.* Professor HAMILTON.

404. *ORNITHOLOGY.* Professor ALLEN, Associate Professor KELLOGG.

405. *WILDLIFE MANAGEMENT.* Professor SWANSON, Associate Professor EADIE, Assistant Professor HEWITT.

406. *FORESTRY.* Professor GUISE, Assistant Professor MORROW.

407. *OCEANOGRAPHY.* Assistant Professor AYERS.

410. *CONSERVATION SEMINAR.* Fall and spring terms. Without credit. Staff. Time and place to be arranged.

ENTOMOLOGY AND LIMNOLOGY

Comstock Hall: *Professors* C. E. PALM, W. E. BLAUVELT, J. C. BRADLEY, J. L. BRANN, F. H. BUTT, D. C. CHANDLER, W. L. COGGSHALL, J. E. DEWEY, HENRY DIETRICH, E. J. DYCE, W. T. M. FORBES, G. G. GYRISCO, J. D. HOOD, H. C. HUCKETT, A. A. LAPLANTE, R. W. LEIBY, J. G. MATTHYSSE, L. B. NORTON, V. S. L. PATE, R. L. PATTON, W. A. RAWLINS, H. H. SCHWARDT, B. V. TRAVIS, L. D. UHLER, T. C. WATKINS, D. A. WEBSTER; at Geneva, *Professors* P. J. CHAPMAN, J. A. ADAMS, A. C. DAVIS, R. W. DEAN, F. L. GAMBRELL, E. H. GLASS, G. E. R. HERVEY, S. E. LIENK, F. G. MUNDINGER, E. H. SMITH, E. F. TASCHENBERG.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Apiculture 1, 2, 3, 4
Insect Ecology 1, 2, 3, 4
Economic Entomology 1, 2, 3, 4
Insect Morphology and Histology 1, 2, 3, 4
Insect Embryology 1, 2, 3, 4
Insect Taxonomy 1, 2, 3, 4
Insect Physiology 1, 2, 3, 4
Insect Toxicology 1, 2, 3, 4
Insecticide Chemistry 1, 2, 3, 4
Medical Entomology 1, 2, 3, 4
Parasitology 1, 2, 3, 4
Limnology 1, 2, 3, 4
Entomology 4

To undertake graduate study the student should not only be prepared in the fundamentals of animal biology but also have or acquire a foundation in the particular phase of the subject which he intends to pursue. He should also have a reading knowledge of French and German.

In the summer, members of the staff are prepared to direct the research of graduate students in connection with the Summer Session of Cornell University.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Entomology and Limnology, Courses 12, 31, 32, 41, and 61.

16. *INSECT ECOLOGY.* Fall term. Credit three hours. Prerequisites, a course in general biology or zoology, and Entomology 12. Professor PALM. Lectures, T Th 11. Comstock 145. Laboratory and field work, Th 2–4:30.

30. *TAXONOMY OF INSECTS.* Spring term. Credit three hours. Prerequisite, Entomology 12. Assistant Professor PATE. Lecture, W 10. Laboratory and field trips, M W 2–4:30. Comstock 300. Preregistration desirable.

118. *THE TECHNICS OF BIOLOGICAL LITERATURE.* Fall term. Credit two or three hours. Professor BRADLEY. Lectures, W F 11, and library work by assignment. Comstock 300.

122. *INSECT MORPHOLOGY, ANATOMY, AND HISTOLOGY.* Throughout the year. Credit three hours a term. Prerequisite, Entomology 12. Associate Professor BUTT. Lecture, T 10. Comstock 145. Laboratory, M W 2–4:30. Comstock 270. Preregistration required.

[123. *INSECT EMBRYOLOGY AND POSTEMBRYONIC DEVELOPMENT.* Spring term. Credit two hours. Prerequisite, Entomology 12 and 122. Associate Professor BUTT. Lecture and laboratory: hours by appointment. Comstock 270. Not given in 1951–52.]

124. *INSECT HISTOLOGY. TECHNIQUE.* Fall or spring term. Credit two hours. Prerequisites, Entomology 12 and 122. Associate Professor BUTT. Two laboratory periods a week by appointment. Comstock 270. Preregistration required.

131. *THE PHYLOGENY AND CLASSIFICATION OF INSECTS.* Fall term. Credit four hours. Prerequisites, Entomology 30 and 31, and 122 should precede or accompany. Professor BRADLEY and Assistant Professor PATE. Lectures, W F 10. Laboratory, T Th 2–4:30. Comstock 300. Preregistration desirable.

133. *TAXONOMY OF THE HOLOMETABOLA: COLEOPTERA AND DIPTERA.* Spring term. Credit three hours. Given in alternate years. Prerequisites, Entomology 30 and 122; may be preceded by 122. Professor BRADLEY and Assistant Professor PATE. Lecture, F 10. Laboratory, T Th 2–4:30. Comstock 300. Preregistration desirable.

[134. *TAXONOMY OF THE HOLOMETABOLA: LEPIDOPTERA AND HYMENOPTERA.* Spring term. Credit three hours. Given in alternate years. A continuation of Entomology 131. Associate Professor FORBES, Professor BRADLEY, and Assistant Professor PATE. Not given in 1951–52.]

151. *PARASITOLOGY.* Spring term. Credit three hours. Given in alternate years. Prerequisites, Zoology 102 or 104. Professor TRAVIS. Lecture, Th 10. Comstock 245. Laboratories, Th 2–4:30 and S 8–10:30, or F 2–4:30 and S 10:30–1. Comstock 200. Preregistration required.

[152. *MEDICAL ENTOMOLOGY.* Spring term. Credit three hours. Given in alternate years. Prerequisites, Zoology 102 or 104 and Entomology 12. Professor TRAVIS. Lecture, Th 10. Laboratories, Th 2–4:30 and S 8–10:30, or F 2–4:30 and S 10:30–1. Not given in 1951–52.]

[154. *WILDLIFE PARASITOLOGY.* Spring term. Credit two hours. Given in alternate years. For qualified graduate and undergraduate students with a special interest in the parasites of wildlife. Prerequisite, permission to register. Professor TRAVIS. Lecture, M 10. Comstock 145. Laboratory, T 10–12:30. Comstock 200. Not given in 1951–52.]

171. *LIMNOLOGY.* Spring term. Credit three hours. Prerequisites, nine hours of biological science and a course in general physics and general chemistry. Associate Professor CHANDLER. Lecture, Th 11. Comstock 145. Laboratory and field trips. F 2–4:30 and S morning by arrangement. Preregistration required.

172. *ADVANCED LIMNOLOGY.* Fall term. Prerequisites, Entomology 171 and permission to register. Associate Professor CHANDLER. Lecture, Th 11. Comstock 145. Laboratory and field trips, F 2–4:30 and S morning by arrangement. Preregistration required.

185. *INSECT PHYSIOLOGY.* Fall term. Credit five hours. Given in alternate years. Prerequisites, Entomology 122, Chemistry 106, and Physics 104. Professor PATTON. Lectures, M W F 9. Comstock 145. Laboratory, M W 2–4:30. Comstock 265. Preregistration desirable.

[195. *CHEMISTRY AND TOXICOLOGY OF INSECTICIDES.* Fall term. Credit five hours. Given in alternate years. Prerequisites, general chemistry and organic chemistry. Professor NORTON and Associate Professor DEWEY. Lectures, M W F 9. Laboratory, M W 2–4:30. Not given in 1951–52.]

[241. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY.* Fall term. Credit

three hours. Given in alternate years. Prerequisite, Entomology 41. Professor SCHWARDT. Lectures, M W F 11. Comstock 145. Not given in 1951–52.]

[242. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY.* Spring term. Credit three hours. Given in alternate years. Prerequisite, Entomology 41. Associate Professors BRANN, DEWEY, and GYRISCO. Lectures, M W F 11. Comstock 145. Not given in 1951–52.]

243. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY.* Fall term. Credit three hours. Given in alternate years. Prerequisite, Entomology 41. Professors BLAUVELT and RAWLINS. Lectures, M W F 11. Comstock 145.

244. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY.* Spring term. Credit three hours. Given in alternate years. Prerequisite, Entomology 41. Professor WATKINS and Associate Professor MATTHYSSE. Lectures, M W F 11. Comstock 145.

[261. *ADVANCED BEEKEEPING.* Throughout the year. Credit three hours a term. Prerequisites, Entomology 12 and 61 and previous beekeeping experience. Professor DYCE and Assistant Professor COGGSHALL. Lectures and laboratory, T Th 2–4:30. Comstock 17. Not given in 1951–52.]

262. *SPECIAL TOPICS IN BEEKEEPING.* Throughout the year. Credit three hours a term. Given in alternate years. Registration by permission only. Professor DYCE and Assistant Professor COGGSHALL. Lectures and laboratory, T Th 2–4:30. Comstock 17.

RESEARCH

300–309. *RESEARCH.* Throughout the year. Prerequisite, permission to register from the professor under whom the work is taken. Comstock Hall.

300. *INSECT ECOLOGY.* Professor PALM.

301. *INSECT MORPHOLOGY, HISTOLOGY, AND EMBRYOLOGY.* Associate Professor BUTT.

302. *INSECT TAXONOMY. All orders:* Professor BRADLEY or Assistant Professor PATE. *Lepidoptera:* Associate Professor FORBES. *Thysanoptera:* Professor HOOD.

303. *ECONOMIC ENTOMOLOGY.* Professors BLAUVELT, LEIBY, PALM, RAWLINS, SCHWARDT, or WATKINS; *Associate Professors* BRANN, DEWEY, GYRISCO, or MATTHYSSE; and Assistant Professor LAPLANTE. At Geneva: Professors CHAPMAN, ADAMS, DAVIS, DEAN, GAMBRELL, GLASS, HERVEY, LIENK, MUNDINGER, SMITH, and TASCHENBERG.

304. *MEDICAL ENTOMOLOGY AND PARASITOLOGY.* Professor TRAVIS.

305. *APICULTURE.* Professor DYCE and Assistant Professor COGGSHALL.

306. *LIMNOLOGY.* Associate Professor CHANDLER.

307. *INSECT PHYSIOLOGY.* Professor PATTON.

308. *INSECT TOXICOLOGY.* Associate Professor DEWEY.

309. *INSECTICIDAL CHEMISTRY.* Professor NORTON.

SEMINAR

JUGATAE. Throughout the year. M 4:30–5:30. Comstock 245.

The work of an entomological seminar is conducted by the *Jugatae,* an entomological club that meets for a discussion of the results of investigations by its members.

GENERAL BIOLOGY

Roberts Hall: *Professor* HOOD.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

General Biology 4.

1. *General Biology.* Throughout the year. Credit three hours a term. Laboratory fee, $3.50 a term.

5. *LABORATORY METHODS IN BIOLOGY.* Fall term. Credit two or three hours. Prerequisite, Biology 1, Zoology 1, or Botany 1, and permission to register. Lecture and laboratory, T or F 10–12:30, and one or more periods by appointment. Roberts 302. Asssitant Professor UHLER.

7. *GENERAL BIOLOGY.* Throughout the year. Prerequisite, at least twelve hours in animal or plant sciences. Professor HOOD. One conference period a week and a minimum of twelve hours in animal or plant sciences to be arranged. For students whose major field is outside animal or plant sciences.

9. *BIOLOGICAL BASIS OF SOCIAL PROBLEMS.* Spring term. Credit three hours. Lectures, T 9, Th 2. Roberts 392. Lecture demonstration, Th 8–10. Roberts 301. Assistant Professor UHLER. For students in the College of Home Economics who intend to enter the field of nursery school teaching, though open to other interested students as well.

310. *RESEARCH PROBLEMS.* Credit and hours to be arranged.

PSYCHOLOGY

Morrill Hall: *Professors* U. BRONFENBRENNER, R. H. DALTON, F. S. FREEMAN, J. J. GIBSON, H. HARVEY, J. E. HOCHBERG, H. S. LIDDELL, R. B. MACLEOD, K. C. MONTGOMERY, T. A. RYAN, P. C. SMITH, A. L. WINSOR.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Comparative Psychology 1, 2, 3, 4

Differential Psychology and Psychological Tests 1, 2, 3, 4

Experimental Psychology 1, 2, 3, 4

Experimental Psychopathology 1, 2, 3, 4

General Psychology 2, 4

History of Psychology and Systematic Psychology 1, 2, 3, 4

Industrial Psychology 1, 2, 3, 4

Personality and Social Psychology 1, 2, 3, 4

Psychobiology 1, 2, 3, 4

The research department possesses a laboratory in Morrill Hall with rooms for general and individual research, for small animal research, for apparatus, for the library of periodical literature, and for meetings of the seminars. This laboratory also includes a workshop for the construction and assemblage of apparatus.

At the Cornell Behavior Farm, a farm of 100 acres near Ithaca, laboratories are equipped for investigations in neuroendocrinology, the conditioned reflex, the experimental neurosis, and other fields of behavior research.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Psychology, Courses 207, 216, 221, 223, 224, 321, 324, 331, 332, 336, 351, 352.

For other related courses, see the *Announcement of the College of Arts and Sciences,* Department of Sociology and Anthropology; the *Announcement of the College of Home Economics,* Department of Child Development and Family Relationships; the *Announcement of the School of Education;* and the *Announcement of the School of Industrial and Labor Relations.*

The following advanced undergraduate courses are open to graduate students.

375. *STATISTICAL METHODS IN PSYCHOLOGY.* Fall term. Credit three hours. Prerequisites, Psychology 101 and Statistics ILR 40. Mr. RYAN.

401. *PSYCHOSOMATIC PROBLEMS.* Spring term. Credit three hours. Prerequisite, consent of the instructor. Mr. HARVEY.

405. *PSYCHOPATHOLOGY.* Fall term. Credit three hours. Prerequisite, nine hours of psychology. Mr. LIDDELL.

410. *INDIVIDUAL DIFFERENCES.* Spring term. Credit three hours. Prerequisite, Psychology 351. Mr. FREEMAN.

411. *PROCEDURES IN CLINICAL CHILD PSYCHOLOGY.* Fall term. Credit three hours. Prerequisite, Psychology 351. Mr. FREEMAN.

422. *COMPARATIVE PSYCHOLOGY.* Spring term. Credit three hours. Prerequisites, Psychology 101 and 112 and consent of the instructor. Mr. MONTGOMERY.

426. *EXPERIMENTAL PSYCHOPATHOLOGY.* Spring term. Credit three hours. Prerequisites, Psychology 405 and consent of instructor. Mr. HARVEY.

432. *PSYCHOLOGY OF LANGUAGE AND THINKING.* Spring term. Credit three hours. Prerequisites, Psychology 101 and 112. Mr. MACLEOD.

455. *ADVANCED INDUSTRIAL PSYCHOLOGY.* Fall term. Credit two hours. Prerequisites, Psychology 331 and 332. Mrs. SMITH.

456. *RESEARCH METHODS IN INDUSTRIAL PSYCHOLOGY.* Spring term. Credit three hours. Prerequisites, Psychology 331 and 332 and consent of instructor. Mrs. SMITH.

476. *TECHNIQUE OF EXPERIMENTATION.* Spring term. Credit three hours. Prerequisite, consent of instructor. Mr. HOCHBERG.

485. *CONTEMPORARY PSYCHOLOGICAL THEORY.* Fall term. Credit three hours. Prerequisites, Psychology 101, 112, and three additional hours of psychology. Mr. HOCHBERG.

499. *MINOR RESEARCH PROBLEMS.* Either term. Credit three hours. Prerequisite, consent of instructor. The Staff.

GRADUATE SEMINARS

Approximately five seminars are offered each term, the selection to be determined by the needs of the students.

511. *PERCEPTION.* Either term. Credit three hours.

513. *LEARNING.* Either term. Credit three hours.

515. *MOTIVATION.* Either term. Credit three hours.

517. *THINKING.* Either term. Credit three hours.

521. *PSYCHOBIOLOGY.* Either term. Credit three hours.

523. *PSYCHOPHYSIOLOGY.* Either term. Credit three hours.

531. *HISTORY OF PSYCHOLOGY.* Either term. Credit three hours.

541. *STATISTICAL METHODS.* Either term. Credit three hours.

543. *CLINICAL METHODS.* Either term. Credit three hours.

545. *METHODS OF SOCIAL ANALYSIS.* Either term. Credit three hours.

547. *METHODS OF CHILD STUDY.* Either term. Credit three hours.

562. *HUMAN DEVELOPMENT AND BEHAVIOR.* Spring term. Credit three hours.

571. *SOCIAL PSYCHOLOGY.* Either term. Credit three hours.

573. *PERSONALITY, NORMAL AND ABNORMAL.* Either term. Credit three hours.

581. *INDUSTRIAL PSYCHOLOGY.* Either term. Credit three hours.

591. *EDUCATIONAL PSYCHOLOGY.* Either term. Credit three hours.

600. *THE TEACHING OF PSYCHOLOGY.* Spring term. Credit three hours.

ZOOLOGY

Professors H. B. ADELMANN, L. C. COLE, P. W. GILBERT, D. R. GRIFFIN, S. L. LEONARD, W. A. WIMSATT, B. P. YOUNG.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Comparative Anatomy 1, 2, 3, 4
Comparative and General Physiology 1, 2, 3, 4
Ecology 1, 2, 3, 4
Endocrinology 1, 2, 3, 4
Histology and Embryology 1, 2, 3, 4
Invertebrate Zoology 1, 2, 3, 4
Neurology 1, 2, 3, 4
Zoology 1, 2, 4

To undertake graduate study the student not only should be well prepared in the fundamentals of zoology but should also have or acquire a foundation in the particular phase of this subject which he intends to pursue.

All prospective graduate students intending to major in zoology must take the Graduate Record Examination in sufficient time to permit consideration of the results along with the candidate's application for admission to the Graduate School.

Attention is also directed to the fields of study and courses offered in the Department of Entomology and the Department of Conservation.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Zoology, *Preregistration is required in all courses.*

COMPARATIVE ANATOMY

Stimson Hall: *Professor* P. W. GILBERT.

The department is well equipped with suitable collections and apparatus to offer graduate work in comparative vertebrate anatomy. Particular emphasis is placed on the functional interpretation of structure, the aim being to correlate the activities and structural adaptations of the living animal. Students majoring in this field will find it advantageous to have taken courses in comparative anatomy, histology, embryology, physiology, and vertebrate ecology.

COMPARATIVE AND GENERAL PHYSIOLOGY

Stimson Hall: *Professor* D. R. GRIFFIN.

Facilities are available for advanced work in comparative physiology and general physiology. There are especially favorable opportunities for research in comparative sensory physiology. Before undertaking advanced work in physiological zoology a student should ordinarily have taken elementary zoology, comparative anatomy, histology, embryology, physics, inorganic and organic chemistry, and at least one laboratory course in physiology. In addition, calculus, physical chemistry, and biochemistry are almost indispensable.

451. *COMPARATIVE PHYSIOLOGY.* Fall term. Credit three hours. Prerequisites, one year of biology or zoology and college courses in chemistry and physics. Organic chemistry and comparative anatomy are also desirable. Associate Professor GRIFFIN. Lectures, W F 9; Laboratory, T W Th or F 1:40–4:30. Preregistration required.

452. *GENERAL AND CELLULAR PHYSIOLOGY.* Spring term. Credit three hours. Prerequisites, Zoology 451, organic chemistry, and permission of the instructor. Histology and calculus are also desirable. Associate Professor GRIFFIN. Seminars, M 2–4 or F 2–4; laboratory, T W or Th 1:40–4:30. Preregistration is required, and graduate students should consult the instructor before registering.

ECOLOGY

Stimson Hall: *Professor* L. C. COLE.

Advanced work in ecology is an individual matter, but the student majoring in this field should have, or plan to obtain, a broad biological background including an acquaintance with genetics and the principles of systematics. Some training in statistical analysis is almost indispensable. A general background in the physical sciences, particularly geography, geology, chemistry, and meteorology is desirable.

401–402. *ECOLOGY AND PHYSIOLOGY OF THE INVERTEBRATES.* Throughout the year. Credit three hours a term. Prerequisites, one year of general biology or introductory zoology plus organic chemistry and college mathematics. Assistant Professor COLE. Lectures, M W 11; Laboratory, W 2–4:30. Preregistration required.

404. *GENERAL ANIMAL ECOLOGY.* Spring term. Credit three hours. Prerequisites, Zoology 101–102 or 103–104, or their equivalent. Assistant Professor COLE. Lectures, W F 10. A total of 8 laboratory and field periods S 8–1. Preregistration required.

ENDOCRINOLOGY

Stimson Hall: *Professor* S. L. LEONARD.

476. *EXPERIMENTAL ENDOCRINOLOGY.* Spring term. Credit two or three hours. Prerequisite, Zoology 101–102 or 103–104 or equivalent, chemistry, and physiology. Associate Professor LEONARD. Open to graduate students only. Lectures, M F 11; laboratory, M 2–4:30 or F 2–4:30 for a limited number of students. Preregistration required.

HISTOLOGY AND EMBRYOLOGY

Stimson Hall: *Professors* H. B. ADELMANN and W. A. WIMSATT.

Advanced work in histology and embryology is of necessity individual. Advanced students are sometimes recommended to take some one or more of the general courses in the subject. As preliminary to graduate work, students are expected to have had the courses in the tissues and one of the following: the organs, special histology, embryology. A year's work in zoology, biology, anatomy, or physiology should precede advanced work in this subject.

302. *THE ORGANS: HISTOLOGY AND DEVELOPMENT.* Spring term. Credit four hours. Prerequisite, Course 301 or its equivalent. Associate Professor WIMSATT and Assistants. Lectures, W F 9; laboratory, W F 2–4:30. Preregistration required.

304. *VERTEBRATE EMBRYOLOGY.* Spring term. Credit five hours. Prerequisite, Biology 1 or Zoology 101–102 or 103–104 and 211–212. Zoology 301 is also

desirable. Professor ADELMANN and Assistants. Lectures, T Th S 11. Laboratory, Section I, T Th 8–11; Section II, T Th 2–4:30. Preregistration required.

308–309. *SEMINAR.* First and second terms. One hour each week. Time to be arranged.

[315. *EXPERIMENTAL EMBRYOLOGY.* Credit two hours. Professor ADELMANN. The course will be conducted as a seminar. Lectures with reports by students dealing with the experimental analysis of developmental processes. Hours to be arranged. Not given in 1951–52.]

INVERTEBRATE ZOOLOGY

Stimson Hall: *Professor* B. P. YOUNG.

515–516. *INVERTEBRATE ZOOLOGY.* Throughout the year. Credit three hours a term. Prerequisite, introductory or general zoology, or equivalent. Open to undergraduate majors and graduate students in the various fields of biology. One lecture a week during laboratory periods; laboratory, F 2–5, and S 9-12. Preregistration required.

NEUROLOGY

Stimson Hall: *Professor* ——.

[224. *COMPARATIVE NEUROLOGY.* Spring term. Credit three hours. Prerequisite, nine hours of animal biology. Professor ——. Hours to be arranged. Lectures, T Th 12; laboratory, M or W 2–4:30. Preregistration required. Not given in 1951–52.]

[226. *CEREBRAL MECHANISMS.* Spring term. Credit three hours. Prerequisite, Course 224. Professor ——. Hours to be arranged. Given if desired by a sufficient number of students. Preregistration required. Not given in 1951–52.]

GENERAL ZOOLOGY

Entomology 100. *ZOOLOGICAL NOMENCLATURE.* Fall term. Without credit. Professor BRADLEY. F 4:45. Comstock 145.

PLANT SCIENCES

Laboratory space is limited and is often overtaxed, especially in courses which admit both graduate students and undergraduates. Graduate students who desire to enroll in such courses are warned to make application for space well in advance of the beginning of instruction. This is particularly true of the second term, since the College of Agriculture holds its preregistration for undergraduates in January. Failure to arrange for laboratory space in advance will probably result in exclusion from courses.

BACTERIOLOGY

Stocking Hall: *Professors* J. M. SHERMAN, GEORGES KNAYSI, M. R. ZELLE, H. B. NAYLOR, C. N. STARK, H. W. SEELEY, JR., E. A. DELWICHE, P. J. VANDEMARK; at Geneva, *Professors* G. J. HUCKER, C. S. PEDERSON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Bacteriology 1, 2, 3, 4 (See also Pathogenic Bacteriology 1, 2, 3, 4; p. 181)

Before taking up graduate work in bacteriology, it is desirable that the student have had general chemistry, qualitative and quantitative analysis, organic chemistry, and introductory courses in the biological sciences.

Formal courses open to undergraduate and graduate students are given in the following subjects:

1. *GENERAL BACTERIOLOGY.* Fall term. Credit six hours. Prerequisite, Chemistry 101. Professors SHERMAN, SEELEY, and Assistants. Lectures, M W F 11. Laboratory practice, M W F 1:40–4. Dairy Industry Building 218 and 301. Preregistration required.

103. *ADVANCED BACTERIOLOGY.* Spring term. Credit six hours. Prerequisite, Course 1, quantitative analysis, and organic chemistry. Professor SHERMAN, Professor SEELEY, and Assistants. Lectures, recitations, and laboratory practice, M W F 1:40–5. Dairy Industry Building 119 and 301. Preregistration required.

105. *HIGHER BACTERIA AND RELATED MICROORGANISMS.* Fall term. Credit four hours. Prerequisite, Course 1. Professor KNAYSI and Assistant. Lectures, recitations, and laboratory practice. T Th 1:40–5. Dairy Industry Building 119 and 323. Preregistration required.

106. *SOIL MICROBIOLOGY.* (Same as Agronomy 106.) Fall term. Credit three hours. Prerequisite, Course 1, Agronomy 1, and Chemistry 201 or its equivalent. Lectures, M W 8. Caldwell 143. Laboratory, F 1:40–4. Caldwell 201.

210. *PHYSIOLOGY OF BACTERIA.* Fall term. Credit two hours. Prerequisites, Course 1 and at least one additional course in bacteriology. Professor DELWICHE. Lectures, T Th 8. Dairy Building 120.

213. *MORPHOLOGY AND CYTOLOGY OF BACTERIA.* Fall term. Credit three hours. Professor KNAYSI. Lectures, T Th S 9. Dairy Building 119.

215. *CHEMISTRY OF BACTERIAL PROCESSES.* Spring term. Credit two hours. Lectures, T Th 8. Dairy Industry Building 119. Professor DELWICHE.

221. *SEMINAR.* Throughout the year. Without credit. Required of graduate students specializing in the Department. Professor SHERMAN. Hours to be arranged. Dairy Building.

BOTANY

Professors LEWIS KNUDSON, F. C. STEWARD, W. C. MUENSCHER, L. C. PETRY, L. F. RANDOPH; D. G. CLARK, R. T. CLAUSEN, H. P. BANKS, C. H. UHL; at Geneva, *Professors* M. T. MUNN, W. F. CROSIER, B. E. CLARK.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Botany 2, 4
Cytology 1, 2, 3, 4
Economic Botany 1, 2, 3, 4
Paleobotany 1, 2, 3, 4
Plant Physiology 1, 2, 3, 4
Plant Taxonomy 1, 2, 3, 4
Plant Morphology (including Anatomy) 1, 2, 3, 4

The laboratories of the Department are in the Plant Science Building, one of the buildings of the College of Agriculture, and are well equipped with the necessary facilities for research. The herbarium contains both local and foreign material for taxonomic study.

The rich flora around Ithaca and its accessibility make the location especially advantageous for many phases of botany, as materials may be easily obtained. Greenhouses are also available for the growing of experimental material.

Seminars are conducted in several of the fields listed above. The purpose of these various seminars is not only to keep abreast of the literature of the subject, but to furnish to the student an opportunity to gain experience in presenting the results of his own research or in critically evaluating the work of others. Graduate students are expected to attend the seminars dealing with their special fields of work.

As a prerequisite for work in any phase of botany the student will be expected to have a knowledge of the fundamental features of botanical science. For work in paleobotany a knowledge of the fundamental features of both botany and geology is prerequisite.

A fundamental training in botany and chemistry is required of any student who expects to major in plant physiology. If it is not possible to obtain this training before entering upon graduate work at Cornell, the student will be expected to broaden his knowledge in botany and chemistry after beginning graduate work.

The University conducts a Summer Session in which there is opportunity for graduate study and research in botany. A prospective student contemplating summer work in botany, including plant physiology, should correspond with the appropriate member of the staff before coming to Ithaca.

PLANT PHYSIOLOGY

31. *INTRODUCTORY PLANT PHYSIOLOGY.* Fall or spring term. Credit four hours. Prerequisite, Course 1 or equivalent. Professor KNUDSON. Lectures, T Th 10. Plant Science 141. Laboratory, T Th 2–4:30; W F 2–4:30; M 2–4:30; S 8–10:30. Preregistration required.

231. *PLANT PHYSIOLOGY, ADVANCED LECTURE COURSE.* A two-term course, fall and spring. Credit three hours a term. Prerequisite, training in botany and chemistry, to be determined in each case by the Department. Professors KNUDSON and STEWARD. Lectures, M W F 10. Plant Science 143.

232. *PLANT PHYSIOLOGY, ADVANCED LABORATORY COURSE.* A two-term course, fall and spring. Credit three hours a term. Prerequisite or parallel, Course 231. Professor CLARK. Laboratory, M 1:40–4, S 8–12:30. Plant Science 241. Preregistration required.

233. *SEMINAR IN PLANT PHYSIOLOGY.* Fall and spring terms. Required of graduate students in plant physiology. Professors KNUDSON, CLARK, and STEWARD. Conference, F 11. Plant Science.

234. *PLANT PHYSIOLOGY, ADVANCED LECTURE COURSE.* Fall term. Credit one hour. Prerequisite, Course 231 or adequate preparation in botany and chemistry. Professor SNYDER. T 4:15–5. Plant Science 241.

RESEARCH IN PLANT PHYSIOLOGY. Professors KNUDSON, CLARK, STEWARD.

PLANT ANATOMY

123. *PLANT ANATOMY.* Fall term. Credit four hours. Prerequisite, Course 1 or the equivalent, and permission to register. Associate Professor BANKS. Lectures, T Th 9. Laboratory, T 10–12:30; Th 10–11:30; S 9–11:30 or M 2–4:30; W 2–3:30; F 2–4:30. Plant Science 228. Preregistration required.

RESEARCH IN PLANT ANATOMY. Associate Professor BANKS.

CYTOLOGY

124. *GENERAL CYTOLOGY.* Fall term. Credit four hours. Prerequisite, Botany 1 or Zoology 1 or equivalent. Assistant Professor UHL. Lectures, M W 9. Plant Science 143. Laboratory, M W or T Th 10–12:30. Plant Science 219. Assignment to laboratory section must be made at the time of registration. Preregistration required.

125. *MICROTECHNIQUE.* Spring term. Credit two hours. Prerequisite, Course 1 and permission to register. Assistant Professor UHL. Hours to be arranged.

224 *CYTOGENETICS.* Spring term. Credit three hours. Prerequisites, Botany 124, Plant Breeding 101, or equivalent. Lectures, M W 9. Plant Science 143. Laboratory, M or W 10–12:30. Plant Science 219. Professor RANDOLPH.

RESEARCH IN CYTOLOGY. Professor RANDOLPH and Assistant Professor UHL.

MORPHOLOGY

(COMPARATIVE MORPHOLOGY OF FUNGI. Given in the Department of Plant Pathology.)

126. *MORPHOLOGY OF VASCULAR PLANTS, LOWER GROUPS.* Spring term. Credit three hours a term. Prerequisites, Course 1 or its equivalent, and permission to register. Associate Professor BANKS. Lectures, M W 11. Laboratory, M W 2–4:30. Plant Science 228.

[127. *MORPHOLOGY OF VASCULAR PLANTS, HIGHER GROUPS.* Spring term. Credit three hours a term. Prerequisites, Course 1 or its equivalent, and permission to register. Associate Professor BANKS. Lectures, M W 11. Laboratory, M W 2–4:30. Plant Science 228. Given in alternate years. Not given in 1951–52.]

RESEARCH IN MORPHOLOGY. Professor PETRY and Associate Professor BANKS.

TAXONOMY

117. *TAXONOMY OF VASCULAR PLANTS.* Fall term. Credit four hours. Prerequisite, Course 1 or its equivalent. Professor CLAUSEN. Lectures, T Th 9; Plant Science 143. Laboratory, T Th 2–4:30; Plant Science 211. Preregistration required.

118. *TAXONOMY OF VASCULAR PLANTS, ADVANCED COURSE.* Spring term. Credit four hours. Prerequisite, Course 117 and either Course 124 or Plant

Breeding 101. Professor CLAUSEN. Lectures, T Th 9; Plant Science 143. Laboratory, T Th 2–4:30; Plant Science 211.

217. *SEMINAR IN TAXONOMY OF VASCULAR PLANTS.* Fall and spring terms. Credit one hour. Required of graduate students taking work in taxonomy. Professor CLAUSEN. Conference, M 4:30. Plant Science 141.

RESEARCH IN TAXONOMY. Professors MUENSCHER and CLAUSEN.

PALEOBOTANY

RESEARCH IN PALEOBOTANY. Professor PETRY, Associate Professor BANKS.

ECONOMIC BOTANY

55. *WEEDS AND POISONOUS PLANTS.* Fall term. Credit three hours. Prerequisite, Course 1 or its equivalent. Professor MUENSCHER. Lecture, F 9. Laboratory, W F 2–4:30. Plant Science 353. Preregistration required.

56. *SEED ANALYSIS.* Spring term. Credit one hour. Prerequisite, Course 1 or its equivalent. Professor MUENSCHER. Lectures and laboratory, F 2–4:30. Plant Science 353. Preregistration required.

115. *AQUATIC PLANTS.* Spring term. Credit three hours. Prerequisite, Course 1 or its equivalent. Professor MUENSCHER. Lecture, M 9. Laboratory, M W 2–4:30. Plant Science 353. Preregistration required.

RESEARCH IN ECONOMIC BOTANY. Professor MUENSCHER.

OTHER COURSES

161. *HISTORY OF BOTANY.* Fall and spring terms. No credit. Hours to be arranged. Plant Science 404.

171. *SPECIAL PROBLEMS IN GENERAL BOTANY, ECOLOGY, ECONOMIC BOTANY, TAXONOMY, MORPHOLOGY, ANATOMY, PALEOBOTANY, CYTOLOGY, AND PHYSIOLOGY.* Throughout the year. Credit not less than two hours a term. Professors KNUDSON, PETRY, MUENSCHER, RANDOLPH, CLARK, CLAUSEN, and STEWARD; Associate Professor BANKS; and Assistant Professor UHL. Hours by appointment.

Students engaged on special problems may register in this course. They must satisfy the instructor under whom the work is taken as to preparation for the problem chosen. The laboratory fee depends on the nature of the work and on the number of credit hours.

RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

Opportunity for graduate research work at Geneva, N.Y., is available in the following fields of botany; cytological investigation on cultivated plants, taxonomic investigation on fruits and vegetables, and investigations on seeds.

PLANT BREEDING

Professors S. S. ATWOOD, R. L. CUSHING, W. T. FEDERER, N. F. JENSEN, A. A. JOHNSON, J. R. LIVERMORE, H. M. MUNGER, R. P. MURPHY, H. H. SMITH, A. M. SRB, R. G. WIGGANS, T. L. YORK; at Geneva, *Professors* JOHN EINSET, RICHARD WELLINGTON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Plant Breeding 1, 2, 3,* 4 — Statistical Methods of Analysis 1, 2, 3, 4

Genetics 1, 2, 3,* 4

*Not approved as minor subject when major is in genetics or plant breeding.

Students who are interested in crop improvement through breeding will register in *plant breeding.* Problems for research may involve studies of breeding technics, the application of genetic principles to breeding, and the correlation of knowledge from other fields in attacks on problems such as yield, quality, adaptability, and disease and insect resistance. The Department now has active research projects with most of the important field and vegetable crops of New York, and certain materials from these are available for graduate student problems. Those students interested in theoretical phases will register in *genetics,* and their research problems generally will deal with genic and chromosomal analyses of hereditary and evolutionary phenomena. Almost any suitable biological materials can be utilized, but the most readily available ones will be those currently being studied by the Departmental Staff in genetic investigations. For those students to whom problems of experimental technic and mathematical analysis of biological data hold the greater appeal, registration will be in *statistical methods of analysis.*

It is advisable that the student entering upon graduate work be well grounded in the fundamentals of the natural sciences. He should have had elementary courses in inorganic and organic chemistry, college algebra, botany or zoology or biology, and plant, animal, or human physiology. Students intending to specialize in biological statistics will find it to their advantage to have additional training in mathematics. Broad training and experience in the field of agriculture is essential for those planning to major in the field of plant breeding.

Students majoring in plant breeding or genetics will find it necessary to remain in Ithaca during the summer, or to make satisfactory arrangements for growing and studying elsewhere the plant material used in connection with their research problems. Since the department has accommodations for only a limited number, prospective students will find it to their advantage to correspond with a member of the departmental staff some months prior to entering upon their work.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Plant Breeding, Courses 1, 101, 102, 150.

201. *BIOCHEMICAL GENETICS.* Spring term. Credit two hours. Prerequisites, Course 101 and a course in organic chemistry, or permission to register. Associate Professor SRB. Lectures, M W 8. Plant Science 141.

203. *METHODS OF PLANT BREEDING.* Fall term. Credit three hours. Prerequisites, Course 101, Botany 1, and a course in at least one of the following: field crops, vegetable crops, floriculture, or pomology. Professor MURPHY. Lectures, T Th 9; Plant Science 141. Laboratory, T 2–4:30; Plant Science 146.

204. *EXPERIMENTAL EVOLUTION.* Spring term. Credit two hours. Prerequisite or equivalent, Course 101. Professor SMITH. Lectures, T Th 10. Plant Science 141. One discussion period, to be arranged.

211. *STATISTICAL METHODS OF ANALYSIS.* Fall term. Credit three hours. Associate Professor LIVERMORE. T 11. Warren 225; Th 2–4. Plant Science 233.

212. *EXPERIMENTAL METHODS.* Spring term. Credit two hours. Prerequisite, Course 211 or equivalent. Professor ATWOOD. F 2–4. Plant Science 141.

213. *ADVANCED STATISTICAL METHODS I.* Fall term. Credit four hours. Prerequisite, Course 211 or equivalent. Professor FEDERER. M W F 8. Plant Science 141. Laboratory to be arranged.

214. *ADVANCED STATISTICAL METHODS II.* Spring term. Credit four hours. Prerequisite, Course 213 or equivalent. Professor FEDERER. T Th S 8. Plant Science 141. Laboratory to be arranged.

222. *SEMINAR.* Fall and spring terms. Without credit. Required of graduate students taking either a major or a minor in this department. Members of departmental Staff. F 4:30. Plant Science 404.

PLANT PATHOLOGY

Professors G. C. KENT, L. M. MASSEY, W. H. BURKHOLDER, C. CHUPP, F. M. BLODGETT, A. B. BURRELL, D. S. WELCH, A. G. NEWHALL, A. W. DIMOCK, L. J. TYLER, W. D. MILLS, A. F. ROSS, K. H. FERNOW, K. G. PARKER, H. S. CUNNINGHAM, L. C. PETERSON, W. F. MAI, B. LEAR, R. E. WILKINSON, C. E. WILLIAMSON, C. W. BOOTHROYD, B. F. LOWNSBERY, JR.; at Geneva, *Professors* J. M. HAMILTON, D. H. PALMITER, W. T. SCHROEDER, A. J. BRAUN, R. M. GILMER, J. J. NATTI.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Mycology 1, 2, 3, 4 Plant Pathology 1, 2, 3, 4

The laboratories of the Department are fully equipped for teaching and research in this subject. Many pieces of apparatus for use in connection with specialized research problems are available, and additional apparatus can be supplied whenever it is needed. Greenhouses having about 12,000 square feet of floor space afford facilities for experimental work and for the culture of diseased and healthy plants for class use. These houses are divided into compartments so that various artificial conditions of temperature and moisture can be maintained for diverse types of plants and kinds of experimental work. Field laboratories in important crop sections of the state are maintained through cooperation with growers. These laboratories provide certain graduate students who receive fellowships (several of which are usually available each year) with an opportunity of pursuing investigations on a large scale under the most favorable commercial conditions.

The pathological herbarium includes a local collection of fungi and pathological materials and sets of well known fungous exsiccati. The library contains most of the important works on plant pathology, mycology, and bacteriology, complete sets of the more important journals, many monographs, and practically all the experiment station literature on these subjects.

Candidates for the Doctor's degree should spend at least one season in the field in order to come into contact with the practical aspects of control problems. They should also have some practice in teaching, for which opportunity will be provided. Students preparing for graduate work in plant pathology are urged to obtain a thorough knowledge of elementary physics and chemistry, including organic and physical chemistry, and of general botany, plant histology, and plant physiology. A reading knowledge of French and German is indispensable in the phytopathological research and must be acquired before the beginning of the third semester of graduate work. Candidates for advanced degrees must have fundamental training in the subjects enumerated above. Opportunity is afforded for further study in these subjects after entering the Graduate School, but a student availing himself of this opportunity cannot expect to receive a degree in the minimum amount of time required for residence. Members of the staff are prepared to direct investigation in the various subdivisions of the broader field. It is urged that prospective students correspond with a member of the departmental staff some months in advance of the time when they expect to enter upon their work.

1. *Elementary Plant Pathology*. See the *Announcement of the College of Agriculture*.

200. *GENERAL PLANT PATHOLOGY*. Fall term. Credit four hours. For graduate students with their major or minor in plant pathology. Open also to qualified graduate students in other fields. Prerequisite, permission to register. Professors KENT, WELCH, and L. J. TYLER. Lecture, T 11. Plant Science 336. Practice, three 3-hour periods weekly — two on T, W, Th, or F 2–4 and one at the student's convenience. Preregistration required.

2. *PRINCIPLES OF PLANT DISEASE CONTROL.* Fall or spring term; preference to graduates in fall and to undergraduates in spring. Credit three hours. Prerequisite, Course 1 or 200 or the equivalent. Professor L. J. TYLER. Lecture hour to be arranged. Plant Science 336. Laboratory, T Th 2–4:30. Plant Science 342. Preregistration required.

201. *ADVANCED PLANT PATHOLOGY.* A two-term course, fall and spring terms. Prerequisites, Course 200, 2, 121, or 221, and permission to register. Professor Ross and Professor MASSEY. Lecture, T 9; Plant Science 336. Practice, T Th 10–12:30; Plant Science 304. Preregistration required.

111. *DISEASES OF TREES AND SHRUBS.* Spring term. Credit three hours. Prerequisite, Course 1 or 200. Professor WELCH. Lecture, W 10; Plant Science 336. Practice, F 2–4:30 and one period to be arranged; Plant Science 362.

121. *COMPARATIVE MORPHOLOGY OF FUNGI.* Fall term. Credit four hours. Prerequisite, Botany 1 or the equivalent, and permission to register. Professor ——. Lecture, M W 11; Plant Science 336. Practice, M W 2–4:30; Plant Science 329. Given in alternate years.

[221. *MYCOLOGY.* A two-term course, fall and spring terms. Credit five hours. Prerequisite, Botany 1 or the equivalent and permission to register. Professor ——. Lecture, M W 11; Plant Science 336. Practice, M W 2–4:30 and one equivalent additional period to be arranged; Plant Science 329. Given in alternate years. Not given in 1951–52.]

222. *ADVANCED MYCOLOGY.* Spring term. Credit five hours. Prerequisite, Course 221. Professor ——. Practice hours and weekly conferences to be arranged. Plant Science 329. Given in alternate years.

231. *HISTORY OF PLANT PATHOLOGY.* A two-term course, fall and spring terms. Requires a reading knowledge of French and German. Professor ——. Designed especially for graduate students specializing in plant pathology.

241. *RESEARCH. Professors* KENT, MASSEY, CHUPP, BURKHOLDER, BLODGETT, WELCH, FERNOW, NEWHALL, MILLS, BURRELL, PARKER, DIMOCK, TYLER, CUNNINGHAM, ROSS, PETERSON, MAI, LEAR, WILKINSON, WILLIAMSON, and BOOTHROYD.

242. *SEMINAR.* Members of the Staff and graduate students. Weekly.

243. *LITERATURE REVIEW.* Members of the Staff and graduate students. Biweekly.

PHYSICAL SCIENCES

ASTRONOMY

Professors R. W. SHAW, M. E. STAHR.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Astronomy 1, 2, 4 Astrophysics 1, 2, 4

Candidates for the degree of Doctor of Philosophy in astronomy or astrophysics will be required to take one minor in physics unless a divided major is granted. In special cases a major in astronomy or astrophysics may consist partly of selected courses in physics. In such cases one minor need not be in physics.

Candidates for the degree of Doctor of Philosophy, Master of Arts, or Master of Science with a major in astronomy or in astrophysics will be required to offer for admission the equivalent of introductory astronomy, six hours of interpretational astronomy, and six hours of electives in the field of astronomy.

Candidates electing a minor in the Department may select such courses as meet their requirements, provided the necessary prerequisites are offered.

Students with advanced standing in the sciences or in mathematics, but who do not desire to major or minor in astronomy, may be admitted after consultation with the professor in charge to such courses in astronomy as may seem desirable.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Astronomy, Courses 101 and 102 (preregistration required).

INTERPRETATIONAL ASTRONOMY

[221. *ORIGIN OF THE SOLAR SYSTEM.* Fall term. Credit three hours. Prerequisite, the Calculus and the consent of the instructor. Associate Professor SHAW. M W F 11. Preregistration required. Not given in 1951–52.]

226. *THEORY OF ORBITS.* Spring term. Credit three hours. Prerequisites, the Calculus and the consent of the instructor. Assistant Professor STAHR. M W F 12. Preregistration required.

[231. *STELLAR STRUCTURE.* Fall term. Credit three hours. Prerequisites, the Calculus and the consent of the instructor. The Staff. M W F 11. Preregistration required. Not given in 1951–52.]

238. *ASTROCHEMISTRY.* Spring term. Credit three hours. Prerequisites, the Calculus and the consent of the instructor. Associate Professor SHAW. M W F 11. Preregistration required.

241. *THE GALAXY.* Fall term. Credit three hours. Prerequisites, the Calculus and the consent of the instructor. Assistant Professor STAHR. M W F 12. Preregistration required.

[244. *EXTERNAL GALAXIES.* Spring term. Credit three hours. Prerequisites, the Calculus and the consent of the instructor. Assistant Professor STAHR. M W F 12. Preregistration required. Not given in 1951–52.]

[275. *ASTROPHYSICS.* Fall and spring terms. Credit three hours a term. Prerequisites, Astronomy 231 or 238 and differential equations. Associate Professor SHAW. Not given in 1951–52.]

285. *ADVANCED GALACTIC STRUCTURE.* Spring term. Credit three hours. Prerequisites, Astronomy 241 and differential equations. Assistant Professor STAHR. Hours to be arranged. Preregistration required.

295. *ADVANCED STUDY AND RESEARCH.* Either term. Credit variable. Prerequisite, consent of the instructor. The Staff.

OBSERVATIONAL ASTRONOMY

[461. *ASTRONOMICAL SPECTROSCOPY.* Fall term. Credit three hours. Prerequisite, consent of instructor. Associate Professor SHAW. Preregistration required. Not given in 1951–52.]

[464. *ASTROMETRY.* Spring term. Credit three hours. Prerequisite, consent of instructor. Assistant Professor STAHR. Preregistration required. Not given in 1951–52.]

[468. *PRACTICAL ASTRONOMY.* Spring term. Credit three hours. Prerequisite, consent of instructor. Associate Professor SHAW. Preregistration required. Not given in 1951–52.]

475. *ADVANCED ASTROPHYSICAL LABORATORY.* Either term. Credit one to three hours. Prerequisites, Astronomy 461, 464 or 468 and consent of instructor. The Staff. Hours to be arranged. Preregistration required.

CHEMISTRY

Professors PETER DEBYE, S. H. BAUER, A. T. BLOMQUIST, T. R. BRIGGS, D. F. DETAR, P. J. FLORY, J. L. HOARD, J. R. JOHNSON, A. W. LAUBENGAYER, F. A. LONG, D. R. MILLER, W. T. MILLER, M. L. NICHOLS, J. PAPISH, H. A. SCHERAGA, M. J. SIENKO, E. R. VAN ARTSDALEN; *Drs.* E. E. MUSCHLITZ, R. K. OSTERHELD, H. POSVIC, R. A. REINHARDT.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Inorganic Chemistry 1, 2, 3, 4	Organic Chemistry 1, 2, 3, 4
Analytic Chemistry 1, 2, 3, 4	Physical Chemistry 1, 2, 3, 4

A graduate student who desires to take either a major or a minor subject in chemistry should select any one of the above branches.

A prospective graduate student is strongly advised to communicate, when applying for admission, with a member of the Faculty in the branch of chemistry in which he wishes to have his major subject. In general, members of the Special Committee should be chosen from different fields of chemistry. It is desirable that candidates for the degree of Doctor of Philosophy select at least one minor subject outside chemistry.

A graduate student who desires to take a minor subject in chemistry with some field other than chemistry as the major subject, will generally be required to offer introductory courses in inorganic chemistry, qualitative analysis, and quantitative analysis as preliminary to his graduate study. The work upon his minor subject in chemistry may be taken in any branch of the subject that he is qualified to pursue and may comprise advanced courses selected from the subjoined list, with the approval of his Special Committee.

Candidates for the degree of Master of Arts, Master of Science, or Doctor of Philosophy with major in chemistry will be required to offer for admission the equivalent of Introductory Inorganic Chemistry 105 and 106; Qualitative Analysis 201 or 212; Quantitative Analysis 215, or 220 and 222; Introductory Organic Chemistry 307 and 308 and 311; Introductory Physical Chemistry 403 and 404 or 407 and 408, and 411; they must also present the equivalent of two units of German.

Candidates for the degree of Doctor of Philosophy with major in chemistry

must have completed, before the beginning of the last year of residence, the equivalent of Quantitative Analysis 220 and 222, Introductory Organic Chemistry Laboratory 312, and Introductory Physical Chemistry Laboratory 412. Graduate students entering from approved universities may take, during their residence for the advanced degree, such of these required courses as they have not already pursued. If a graduate student lacks at entrance several of these preliminary courses, more than the minimum periods of residence may be necessary.

Proficiency tests will be required of all entering candidates for advanced degrees (M.S. or Ph.D.) in chemistry. These tests, which will be given a few days before registration for the fall term, will cover the divisions of inorganic, analytical, organic, and physical chemistry. Each test will be from two to two and one-half hours in length and will cover material normally presented in elementary courses in the subjects listed above.

Results of these tests will be used to aid the student's Special Committee in the selection of his program of courses. While the results will not be considered in the usual sense of "passing" or "failing," low marks in one or more of the tests may require a preponderance of elementary courses during a term and a reduced residence credit for that term.

Qualifying examinations required of all candidates for the Doctor's degree will follow the general procedure outlined on page 25 of this Announcement.

After the candidate has completed his minor subjects, he will be required to pass a general examination, both written and oral, on his major and minor subjects. Upon recommendation of the candidate's Special Committee, this examination may be taken toward the end of the term preceding his last year of residence. This procedure makes it possible for the candidate to devote his last year of residence to uninterrupted research on his thesis. At the close of his period of residence, and after the acceptance of his thesis, the candidate will be required to pass a final oral examination on the thesis and on related subjects.

As an alternative procedure, the general examination on major and minor subjects and on the thesis may be taken after the acceptance of the thesis.

Graduate students are required to register with the Department of Chemistry on the registration days at the beginning of each term. Entering students must consult with the chairman of the departmental Graduate Scholarship Committee at this time.

For a more detailed description of the courses in the various branches of chemistry, see the *Announcement of the College of Arts and Sciences* and the *Announcement of the College of Engineering.*

All courses in chemistry are open to properly qualified graduate or undergraduate students. It may be necessary for a graduate student in chemistry to take one or more of the courses primarily for undergraduates, either as prerequisite to his graduate work or as an essential part of his major and minor subjects.

Fellowships and scholarships are ordinarily awarded only for the last year of residence for the doctorate. Ordinarily research assistantships are awarded only to students who have completed one or more years of residence. Teaching assistantships are open to entering graduate students.

All courses listed below are to be given in the Baker Laboratory of Chemistry.

INORGANIC CHEMISTRY

For undergraduate courses in inorganic chemistry which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Chemistry, Courses 105, 106, 111, 112, and 115. Preregistration is required in all these courses.

575 and 576. *ADVANCED INORGANIC CHEMISTRY.* Throughout the year. Credit three hours a term. Prerequisite or parallel courses. Chemistry 403 and 404, or 407 and 408, or consent of the instructor. Professor LAUBENGAYER. M W F 11. Baker 107.

580. *ADVANCED INORGANIC LABORATORY.* Either term. Credit two to six hours. Prerequisites, Chemistry 307, 308, 311, and 312 and consent of the instructor. Chemistry 580 is designed to accompany Chemistry 575 and 576 but may be taken separately. Professor LAUBENGAYER, Assistant Professors VAN ARTSDALEN and SIENKO, and Dr. OSTERHELD. Day and hours to be arranged. Baker 178.

585 and 586. *SELECTED TOPICS IN ADVANCED INORGANIC CHEMISTRY.* Throughout the year. Credit two hours a term. Students may register for either term separately. Prerequisite, Chemistry 403 and 404, or 407 and 408 and consent of the instructor. Instructors and topics to be announced. T Th 11. Baker 107.

ANALYTICAL CHEMISTRY

For undergraduate courses in analytical chemistry which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Chemistry, Courses 201, 212, 215, 220, and 222. Preregistration is required in all these courses.

240. *SPECIAL METHODS OF QUANTITATIVE ANALYSIS.* Either term. Credit three hours. Prerequisite, Chemistry 220 and 222, or the consent of the instructor. Professor NICHOLS and Assistants. Lecture, T 11, Baker 207. Laboratory, M T or Th F 2–4:30. Baker 282 and 294. Preregistration required.

265. *ADVANCED QUANTITATIVE LABORATORY.* Spring term. Credit two to four hours. Prerequisite, Chemistry 240 or consent of the instructor. Professor NICHOLS and Assistant Professor SCHERAGA. Hours to be arranged. Baker 294. Preregistration required.

[275. *QUANTITATIVE MICROANALYSIS.* Fall term. Credit three or more hours. Prerequisite, consent of the instructor. Enrollment is limited. Professor NICHOLS and Assistant. Laboratory, W F 9–5. Baker 358. Preregistration required. Not given in 1951–52.]

[280. *EMISSION SPECTROSCOPY IN CHEMICAL ANALYSIS.* Either term. Credit three hours. Prerequisite, consent of the instructor. Professor PAPISH and Assistant. Conference, one hour, to be arranged. Laboratory, hours to be arranged. Baker 396. Preregistration required. Not given in 1951–52.]

[285. *SPECTROCHEMICAL ANALYSIS.* Either term. Credit two or more hours. Prerequisite, Chemistry 280. Professor PAPISH and Assistant. Laboratory, hours to be arranged. Baker 396. Preregistration required. Not given in 1951–52.]

[290. *ADVANCED QUANTITATIVE ANALYSIS.* Spring term. Credit two hours. Prerequisite, Chemistry 403 or 407. Professor NICHOLS. Lectures, W F 9, Baker 207. Given in alternate years. Not given in 1951–52.]

ORGANIC CHEMISTRY

For undergraduate courses in organic chemistry which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Chemistry, Courses 303, 305, 307, 308, 311 and 312. Preregistration is required in all these courses.

320. *IDENTIFICATION OF ORGANIC COMPOUNDS.* Either term. Credit four hours. Prerequisites, Chemistry 307, 308, 311, and 312, at grades of 75 or better. Professor MILLER and Assistants. Lectures, T Th 8; Baker 377; Laboratory, T Th 2–4:30, or F 2–4:30 and S 10–12:30; Baker 378. Preregistration required.

330. *ADVANCED ORGANIC LABORATORY.* Either term. Credit two to four hours. Prerequisite, Chemistry 312 and 320, and the consent of the instructor. Professors JOHNSON and MILLER, Associate Professor BLOMQUIST, Assistant Professor DETAR, and Doctor POSVIC. Hours to be arranged. Baker 352.

365 and 366. *ADVANCED ORGANIC CHEMISTRY.* Throughout the year. Credit three hours a term. Prerequisite, Chemistry 307 and 308, 311 and 312 and 320, or the consent of the instructor. Students may register for either term separately. Professor JOHNSON and Assistant Professor DETAR. Lectures, M W F 12. Baker 177.

375 and 376. *SELECTED TOPICS IN ORGANIC CHEMISTRY.* Throughout the year. Credit two hours a term. Prerequisite, Chemistry 365 and 366. Associate Professor BLOMQUIST. Lectures, T Th 9. Baker 377. Given in alternate years.

[380. *ORGANIC CHEMISTRY OF HIGH POLYMERS.* Fall term. Credit two hours. Prerequisite, Chemistry 365 and 366, or consent of the instructor. Professor MILLER. Lectures, M W 11. Baker 377. Given in alternate years. Not given in 1951–52.]

385. *PHYSICAL ASPECTS OF ORGANIC CHEMISTRY.* Fall term. Credit two hours. Prerequisite, Chemistry 320 or 365 and 366, and the consent of the instructor. Professor MILLER. Lectures, M W 11. Baker 377. Given in alternate years.

[395 and 396. *CHEMISTRY OF NATURAL PRODUCTS.* Throughout the year. Credit two hours a term. Prerequisite, Chemistry 320 or 365 and 366. Students may register for either term separately. Dr. POSVIC. Lectures, T Th 9. Baker 377. Given in alternate years. Not given in 1951–52.]

PHYSICAL CHEMISTRY

For undergraduate courses in physical chemistry which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Chemistry, Courses 403, 404, 407, 408, 411, and 412. Preregistration is required in all these courses.

[431 and 432. *APPLIED ELECTROCHEMISTRY.* Throughout the year. Credit two hours a term. Prerequisite Chemistry 403 and 404 or Chemistry 407 and 408. Professor BRIGGS. Lectures, T Th 9. Baker 7. Given in alternate years. By electing Chemistry 465 (two or more hours), the student may obtain laboratory practice in many of the subjects which are presented in the lectures. Not given in 1951–52.]

440. *COLLOID CHEMISTRY.* Spring term. Credit three hours. Prerequisite, Chemistry 403 and 404, or 407 and 408. Professor BRIGGS. Lectures, M W F 11. Baker 7. Given in alternate years.

445. *APPLICATION OF THE PHASE RULE.* Fall term. Credit three hours. Prerequisite, Chemistry 403 and 404 or Chemistry 407 and 408. Professor BRIGGS. Lectures, M W F 11. Baker 7.

450. *SOLID STATE.* Fall term. Credit three hours. Prerequisite, Chemistry 403 and 404 or Chemistry 407 and 408. Professor HOARD. Lectures, T Th S 11. Baker 7. Given in alternate years.

455. *KINETICS OF CHEMICAL REACTIONS.* Spring term. Credit three hours. Prerequisite, Chemistry 403 and 404 or Chemistry 407 and 408 and consent of the instructor. Professor LONG. Lectures, M W F 11. Baker 177.

460. *CHEMICAL PHYSICS.* Spring term. Credit two hours. Open to seniors and graduate students majoring in chemistry and physics. Professor DEBYE. Lectures, S 11–1. Baker 377. Conference, one hour a week, to be arranged.

[461. *RADIOCHEMISTRY.* Fall term. Credit three hours. Prerequisite, Chemistry 403 and 404, or 407 and 408. Assistant Professor MILLER. Lectures, M W F 12. Baker 18. Given in alternate years. Not given in 1951–52.]

465. *ADVANCED LABORATORY PRACTICE IN PHYSICAL CHEMISTRY.* Either term. Credit variable, but not to exceed six hours a term. Prerequisite, determined in each case by the professor in charge. Professors BRIGGS, FLORY, HOARD, LONG, and BAUER, and Dr. MUSCHLITZ. Hour and place to be arranged.

471 and 472. *THERMODYNAMICS.* Throughout the year. Credit three hours a term. Prerequisite, Chemistry 403 and 404 or 407 and 408. Professor FLORY. Lectures, M W F 9. Baker 107.

480. *STATISTICAL MECHANICS.* Fall term. Credit three hours. Prerequisite, Chemistry 491 or equivalent is desirable but not required. Professor FLORY. Lectures, T Th S 10. Baker 7. Given in alternate years.

[482. *PHYSICAL CHEMISTRY OF HIGH POLYMERS.* Spring term. Credit two hours. Prerequisite, Chemistry 380, 471 and 472, or consent of the instructor. Professor FLORY. Lectures, M W 11. Baker 377. Given in alternate years. Not given in 1951–52.]

[485. *X-RAY CRYSTALLOGRAPHY.* Spring term. Credit three hours. Prerequisite, Physics 225 or consent of the instructor. Professor HOARD. Given in alternate years. Not given in 1951–52.]

[491. *INTRODUCTION TO QUANTUM MECHANICS.* Fall term. Credit two hours. Prerequisite, consent of the instructor. Professor DEBYE. Lectures, S 11-1. Baker 377. Conference, one hour a week, to be arranged. Given in alternate years. Not given in 1951–52.]

[492. *QUANTUM CHEMISTRY.* Spring term. Credit three hours. Prerequisite, Chemistry 491 or its equivalent. Associate Professor BAUER. Lectures, M W F 9. Baker 377. Given in alternate years. Not given in 1951–52.]

495. *MOLECULAR SPECTRA.* Fall term. Credit three hours. Prerequisite, consent of the instructor. Associate Professor BAUER. Lectures, hours to be arranged. Baker 18. Given in alternate years.

GEOLOGY AND GEOGRAPHY

Professors W. S. COLE, C. M. NEVIN, J. W. WELLS, A. L. ANDERSON, J. D. BURFOOT, JR., W. T. HOLSER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Mineralogy 1, 2, 3, 4
Mineralogy and Petrology 1, 2, 3, 4
Economic Geology 1, 2, 3, 4
Paleontology 1, 2, 3, 4
Paleontology and Stratigraphy 3
Petrology 1, 2, 3, 4
Geomorphology 1, 2, 3, 4
Glacial Geology 1, 2, 3, 4
Structural Geology 1, 2, 3, 4
Stratigraphy 1, 2, 3, 4
Sedimentation 1, 2, 3, 4
Geology 4
Geography 1, 2, 3, 4

Applicants for admission to candidacy for advanced degrees with major in any of the above fields must submit test scores for the Graduate Record Examination Aptitude Test (see p. 00).

Under the general title of geology and geography are included structural geology, physical, regional, and economic geography, geomorphology, glacial

geology, mineralogy, petrology, paleontology and stratigraphy, and economic geology.

The University Library has a very large collection of maps, reference books, periodicals, and geological society transactions, as well as files of North American, European, and other geological survey reports. The Department possesses a collection of more than 65,000 authors' separates. Complete facilities for all kinds of laboratory investigation are available.

Graduate work in geology may include investigation, under approved direction, in the field away from Ithaca.

For undergraduate courses which often meet the needs of graduate students see the *Announcement of the College of Arts and Sciences,* Department of Geology.

STRUCTURAL GEOLOGY, SEDIMENTATION, AND PETROLEUM GEOLOGY

Professor NEVIN.

Graduate research in any of these subjects should preferably be based on field work.

301. *STRUCTURAL GEOLOGY.* Fall term. Credit three hours. Prerequisite, Geology 101–102 or equivalent. Two lectures, one laboratory. M W 11, M 2–4:30. McGraw 150.

303. *SEDIMENTATION.* Spring term. Credit three hours. Prerequisite, Geology 101–102 or equivalent. Two lectures, one laboratory. M W 11. M 2–4:30. McGraw 150.

321. *PETROLEUM GEOLOGY.* Fall term. Credit three hours. Prerequisite, Geology 101–102 or equivalent. Two lectures, one laboratory. M W 9, W 2–4:30. McGraw 150.

391–392. *SEMINAR IN STRUCTURAL GEOLOGY AND SEDIMENTATION.* Throughout the year. Credit variable. For advanced students. M 4:45. McGraw 150.

395–396. *ADVANCED OR SPECIAL WORK IN STRUCTURAL GEOLOGY, SEDIMENTATION, AND PETROLEUM GEOLOGY.* Throughout the year. Credit variable. McGraw 150.

901. *GEOLOGIC MAPPING.* Given at the summer field camp. Credit six hours. (Special circular, on request, from the Department.)

GEOMORPHOLOGY AND GEOGRAPHY

Assistant Professor ——.

The plateau area in which Cornell University is situated contains outstanding landforms which were developed in a normal cycle of erosion and subsequently modified by continental glaciers. Excellent opportunities for research are afforded by the immediate region and by the facilities available in the laboratories and libraries of the Department and University. Moreover, ample resources are available in the University for geographic investigation under the direction of the staff of the Department.

401. *GEOMORPHOLOGY.* Fall term. Credit three hours. Prerequisite, Geology 101–102. Lectures, T Th 9; laboratory, T 2–4:30. McGraw 265. Preregistration required.

[403. *GLACIATION AND THE PLEISTOCENE EPOCH.* Spring term. Credit three hours. Prerequisite, Geology 101–102. Two lectures, one laboratory. T Th 10, T 2–4:30. McGraw 265. Alternate year course. Not given in 1951–52.]

495–496. *ADVANCED OR SPECIAL WORK IN GEOMORPHOLOGY AND GEOGRAPHY.* Throughout the year. Credit variable. Prerequisite, an adequate background of course work in geology. Hours to be arranged. McGraw 265.

MINERALOGY AND PETROLOGY

Associate Professor BURFOOT and *Assistant Professor* HOLSER.

The laboratory equipment for microscopical work is modern and complete and includes universal stages, one of which is being adapted to the double variation procedure. Other equipment for determinative mineralogy includes a carbon-arc spectroscope and adequate equipment for silicate analysis. Laboratory facilities for X-ray diffraction studies are at present provided in the Department of Chemistry. Mineralogical research is facilitated at high temperatures by an electric furnace with controlled and recorded temperatures and under high pressure hydrothermal conditions by the use of steel bombs.

The study collections in mineralogy and petrology are widely representative of species and types of occurrence from localities throughout the world and are constantly being expanded. A collection of more than 6,000 thin sections enables microscopical study of representative specimens from the petrological collections. The mineralogical collections include the Benjamin Silliman, Jr., Collection, which was acquired before the opening of the University in 1868.

The research program emphasizes the solution of fundamental problems of mineralogy and petrology by the application of physicochemical principles and should include correlative field and laboratory work.

207–208. *MINERALOGY.* Throughout the year. Credit three hours a term. Prerequisite, Chemistry 106. Fall term prerequisite to spring term. Assistant Professor HOLSER. Lectures: fall term M W 10. spring term T Th 9; McGraw 165. Laboratory, F 2–4:30; McGraw B65. Preregistration required.

209. *LITHOLOGY.* Spring term. Credit three hours. Prerequisite, Geology 102 and 208. Associate Professor BURFOOT. Lecture, M 12. Laboratories, T Th 2–4:30. McGraw 145. Preregistration required.

501. *OPTICAL MINERALOGY.* Fall term. Credit three hours. Prerequisite, Geology 208. Assistant Professor HOLSER. Lecture, W 12; McGraw 145. Laboratories, F 8–10:30 and S 9–11:30; McGraw 345. Preregistration required.

502. *PETROGRAPHY.* Spring term. Credit three hours. Prerequisite, Geology 501; prerequisite or parallel, Geology 209. Associate Professor BURFOOT. Lecture, W 9; McGraw 145. Laboratories, F 8–10:30 and S 9–11:30; McGraw 345. Preregistration required.

521. *SEDIMENTARY PETROGRAPHY.* Fall term. Credit three hours. Prerequisites, Geology 209 and 501. Associate Professor BURFOOT. Lectures, M W 9; McGraw 145. Laboratory, F 10:30–1:00; McGraw 345 and B65. Preregistration required. Alternate year course. Given in 1951–52.

[575. *IGNEOUS PETROGENY.* Fall term. Credit three hours. Prerequisite, Geology 502. Associate Professor BURFOOT. Lectures, M W 9; McGraw 145. Laboratory, F 10:30–1; McGraw 345. Preregistration required. Alternate year course. Not given in 1951–52.]

[577. *METAMORPHIC GEOLOGY.* Spring term. Credit three hours. Prerequisites, Geology 502 and 301; recommended, Geology 702. Associate Professor BURFOOT. Lectures, M W 9; McGraw 145. Laboratory, F 8–10:30; McGraw 145 and 345. Preregistration required. Alternate year course. Not given in 1951–52.]

[581. *STRUCTURAL MINERALOGY.* Fall term. Credit three hours. Prerequisites, Geology 208, Physics 108. Required parallel, laboratory work on X-rays

in Department of Physics. Credit one hour. See special circular of Department of Geology. Assistant Professor HOLSER. Lectures, M W 11. Laboratory, F 10:30–1. McGraw 145. Preregistration required. Alternate year course. Not given in 1951–52.]

583. *CHEMICAL MINERALOGY.* Spring term. Credit three hours. Prerequisite, Geology 208; recommended, Geology 501 and 581 and Chemistry 408. Assistant Professor HOLSER. Lectures, M W 11. Laboratory, F 10:30–1. McGraw 145. Preregistration required. Alternate year course. Given in 1951–52.

591–592. *SEMINAR IN MINERALOGY AND PETROLOGY.* Throughout the year. Credit one hour a term. Prerequisite, permission of instructor. Assistant Professor HOLSER and Associate Professor BURFOOT. W 4:45. McGraw 145. Preregistration required.

595–596. *ADVANCED OR SPECIAL WORK IN MINERALOGY AND PETROLOGY.* Throughout the year. Credit variable. Prerequisite, variable. Associate Professor BURFOOT and Assistant Professor HOLSER. Days and hours to be arranged. McGraw 145, 345, B–65.

PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

Professors COLE and WELLS.

The University is so situated that excellent exposures of Devonian formations are at its very door, and the typical sections of New York State which are of fundamental importance in American Paleozoic geology are within short excursion range. The most important of these are the Rochester and Niagara gorges, Trenton Falls and the Helderberg escarpment, the Chemung Valley, and the coal fields of northern Pennsylvania.

Facilities are afforded to those desiring to study the later formations, since the Department has collections made in the West Indies and Central and South America, as well as in different parts of the United States and Europe. There are also the Newcomb collection (10,000 species of recent shells) and a wealth of conchological literature in the geological and general libraries.

201. *HISTORIC GEOLOGY.* Fall term. Credit three hours. Prerequisite, Geology 101–102. Professor WELLS. Lectures, M W 9. Laboratory, W 2–4:30. McGraw 450.

601–602. *INVERTEBRATE PALEONTOLOGY.* A two-term course; fall and spring terms. Credit three hours a term. Prerequisite, Geology 101–102 and, if possible, invertebrate zoology. Professors COLE and WELLS. Lectures, T Th 10. McGraw 450. Laboratory: fall term, Th 2–4:30; spring term, W 2–4:30. McGraw 450.

605–606. *STRATIGRAPHY.* Throughout the year. Credit three hours a term. Prerequisites, Geology 101–102 and first term of 601–602. T Th 9, W 10. Professors COLE and WELLS.

675. *MICROPALEONTOLOGY.* Spring term. Credit two hours. Prerequisite, permission of the instructor. Student should have Geology 101–102, 605, and 601–602. Professor COLE. W 9 and hours to be arranged. McGraw 450.

681. *GEOLOGY OF NEW YORK STATE.* Spring term. Credit two hours. Prerequisites, Geology 101–102, 605, 601–602, or permission of instructor. Professor WELLS. Lectures in winter months, all-day field trips in spring months. T Th 12 and days to be arranged. McGraw 450.

695–696. *ADVANCED OR SPECIAL WORK IN PALEONTOLOGY AND STRATIGRAPHY.* Throughout the year. Credit variable. Prerequisites, Geology

605 and 601–602. Professors COLE and WELLS. Day and hours to be arranged. McGraw 450.

[912. *GEOLOGIC INTERPRETATION OF AERIAL PHOTOGRAPHS.* Fall term. Credit three hours. Prerequisite, Geology 301. Intended for majors in geology. Lecture, M 12, two laboratories by arrangement. McGraw 450. Professor WELLS. Alternate year course. Not given in 1951–52.]

ECONOMIC GEOLOGY

Associate Professor ANDERSON.

The work in economic geology is designed to familiarize the student with the origin, occurrence, and distribution of the mineral products of economic value, and also with the practical application of geological principles. The laboratory contains an excellent study collection of economic materials from the United States, Canada, Mexico, Europe, and Africa, including ores, fuels, clays, abrasives, building stones, etc., most of these representing suites of materials collected by members of the staff of instruction on geological trips. This collection is supplemented by maps and models.

In addition to the collections the economic geology laboratory has facilities for general work and research on economic materials; the equipment for metallographic work on ores is excellent.

The work of graduate instruction consists in part of lectures and in part of special work arranged to suit the needs of the individual student. Students who are registered for a major subject in economic geology are expected to engage in research, which should preferably be based on field work.

Excursions may readily be taken to the anthracite regions of Pennsylvania; to the iron, slate, cement, and talc regions near Easton, Pa.; to the metal mines of the Adirondacks, etc. Field trips of greater or less length are taken to some of these localities every year.

701–702. *GENERAL ECONOMIC GEOLOGY.* A two-term course. Credit three hours a term. Prerequisite, Geology 102 (or 113) and 208 or permission of the instructor. Lectures, T Th 11. Laboratory, F 2–4:30. McGraw 150.

[721. *MICROSCOPIC STUDY OF ORE MINERALS.* Fall term. Credit two hours. Prerequisite, Geology 208 and 502. F 8–10:30. S 9–11:30. McGraw 250. Alternate year course. Not given in 1951–52.]

[732. *MINING GEOLOGY.* Spring term. Credit three hours. Prerequisites, Geology 701–702. M W F 8. McGraw 150. Alternate year course. Not given in 1951–52.]

775–776. *MINERAL DEPOSITS.* A two-term course. Credit three hours a term. Prerequisites, Geology 701–702. Lectures, M W F 8. McGraw 150. Alternate year course. Given in 1951–52.

791–792. *ECONOMIC GEOLOGY SEMINAR.* Throughout the year. Credit one hour a term. T 4:45. McGraw 150.

795–796. *ADVANCED OR SPECIAL WORK IN ECONOMIC GEOLOGY.* Throughout the year. Credit variable. Prerequisite, dependent on the nature of the work.

MATHEMATICS

Professors W. A. HURWITZ, R. P. AGNEW, J. B. ROSSER, MARK KAC, R. J. WALKER, W. H. J. FUCHS, HARRY POLLARD, G. A. HUNT, PAUL OLUM, BERTRAM YOOD; *Drs.* CHRISTINE AYOUB, A. S. SHAPIRO.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Algebra 1, 2, 3
Mathematical Analysis 1, 2, 3
Geometry 1, 2, 3
Applied Mathematics 1, 2, 3
Mathematics 1, 2, 4

If mathematics (as distinct from one of its subdivisions) is chosen as major subject, the minor subject or subjects must be chosen from some other field or fields of study.

It is recommended that when the major subject for the degree of Ph.D. is in the field of mathematics, at least one minor subject be chosen from some other field.

The graduate work provides instruction in the principal branches of mathematics and furnishes preparation and material for independent investigation. Only a portion of the whole field can be covered by the courses given in a single year. The courses are changed, therefore, from year to year to meet the needs of students.

In addition to the regular instruction, individual guidance and advice are offered to any student who wishes to follow a particular line of inquiry.

Students who take mathematics as a major subject for an advanced degree must have completed previously the equivalent of the elementary course in analytic geometry and calculus, and further study in at least one more advanced subject, as for example, differential equations, advanced calculus, modern algebra, or projective or advanced analytic geometry.

The Oliver Mathematical Club, composed of teachers and advanced students, meets weekly, and has for its object the systematic presentation by the members of some specified mathematical theory of recent development and of reports on articles in recent journals and on results of special reading and investigations. Discussion and reading groups or seminars are also frequently organized to meet other special interests, sometimes with the cooperation of teachers and students in fields other than mathematics.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Mathematics, Courses 201, 241, 242, 323, 341, 401, 402, 453, 605, 607, 608, 611, 612, 711, 712.

ALGEBRA

371, 372. *MODERN ALGEBRA.* Throughout the year. Credit three hours a term. Prerequisite, Mathematics 173. Dr. AYOUB. T Th S 9.

GEOMETRY

413. *POINT SET TOPOLOGY.* Spring term. Credit three hours. Prerequisite, Mathematics 505 or the equivalent. Dr. SHAPIRO. M W F 11.

495, 496. *TOPOLOGICAL GROUPS.* Throughout the year. Credit three hours a term. Prerequisite, Mathematics 512 and 372. M W 2–3:15.

ANALYSIS

501, 502. *ADVANCED CALCULUS.* Throughout the year. Credit three hours a term. Prerequisite, Mathematics 173. Professor AGNEW. M W F 11.

505. *FOUNDATIONS OF ANALYSIS.* Fall term. Credit three hours. Prerequisite, Course 502 or consent of the teacher. Dr. SHAPIRO. M W F 11.

507. *HILBERT SPACE.* Spring term. Credit three hours. Prerequisite, Mathematics 505 or the equivalent. Professor YOOD. T Th 2–3:15.

[511, 512. *REAL FUNCTIONS.* Throughout the year. Prerequisite, Mathematics 505. Given in alternate years. Not given in 1951–52.]

531, 532. *COMPLEX VARIABLES.* Throughout the year. Credit three hours a term. Prerequisite, Mathematics 502 or 612. Professor FUCHS. M W F 10.

537, 538. *FOURIER ANALYSIS.* Throughout the year. Credit three hours a term. Prerequisite, Mathematics 512. Professor HUNT. T Th 2–3:15.

543. *ANALYTIC THEORY OF NUMBERS.* Fall term. Credit three hours. Prerequisite, Mathematics 532. Professor ROSSER. M W F 10.

APPLIED MATHEMATICS

621, 622. *MATHEMATICAL METHODS IN PHYSICS.* Throughout the year. Credit five hours a term. Prerequisite, Mathematics 201 and at least two years of general physics. Professor OLUM. M T W Th F 12.

641, 642. *PARTIAL DIFFERENTIAL EQUATIONS.* Throughout the year. Credit three hours a term. Prerequisite, Mathematics 612. M W F 9.

METEOROLOGY

Assistant Professor WIDGER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Meteorology 1, 2, 4

A broad field for investigation and research is offered in meteorology. The weather and climatic factors, both of themselves and in their relation to crop distribution and production, are suitable subjects for graduate study. Furthermore, students majoring in other areas (for example, in such diverse topics as engineering, transportation, economics, and social problems) may find meteorological and climatological data and principles have an important bearing on their own fields of investigation.

A graduate student in meteorology should have completed the elementary courses in meteorology and climatology, physics, mathematics, and elementary statistics.

1. *Basic Meteorology.* See the *Announcement of the College of Agriculture.*

[2. *GENERAL CLIMATOLOGY.* Fall term. Credit two hours. Prerequisite, Course 1. Assistant Professor WIDGER. Lectures and recitations, M W 9. Plant Science 114. Given in alternate years. Not given in 1951–52.]

105. *METHODS IN CLIMATOLOGY.* Fall term. Credit three hours. Prerequisite, Course 2 or permission of the instructor. Assistant Professor WIDGER. Lectures and recitations, M W F 9, Plant Science 114. Will be offered in alternate years only.

[106. *MICROCLIMATOLOGY.* Spring term. Credit three hours. Prerequisite, Course 1 or permission of the instructor. Assistant Professor WIDGER. Lectures and recitations, M W F 9, Plant Science 114. Given in alternate years. Not given in 1951–52.]

211. *RESEARCH.* Fall or spring term. Credit one or more hours. Prerequisite, permission of the instructor. Assistant Professor WIDGER.

212. *SPECIAL TOPICS.* Fall or spring term. Credit one or more hours. Prerequisite, permission of the instructor. Assistant Professor WIDGER.

PHYSICS

Professors L. P. SMITH, (C. P. BAKER, Nuclear Studies, on leave), L. L. BARNES, H. A. BETHE, G. COCCONI, D. R. CORSON, (T. R. CUYKENDALL, Engineering Physics), J. W. DEWIRE, F. J. DYSON, G. E. GRANTHAM, K. I. GREISEN, P. L. HARTMAN, J. A. KRUMHANSL, B. D. MCDANIEL, P. MORRISON, C. C. MURDOCK, H. F. NEWHALL, L. G. PARRATT, (H. S. SACK, Engineering Physics), (B. SIEGEL, Engineering Physics), R. L. SPROULL, D. H. TOMBOULIAN, R. R. WILSON, and W. M. WOODWARD; *Doctors* C. W. GARTLEIN, J. S. LEVINGER, N. SCHWARTZ.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Physics 1, 2, 3, 4	Theoretical Physics 1, 2, 3, 4
Experimental Physics 1, 2, 3, 4	Biophysics 3, 4

The major and both minor subjects for the doctorate should not be chosen inside the field of physics.

The major subject for the doctorate may be called experimental physics only if accompanied by theoretical physics as a minor, and theoretical physics only if accompanied by experimental physics as a minor.

Members of the staff are especially interested in directing graduate research in the following fields:

EXPERIMENTAL PHYSICS. Nuclear Physics; cosmic rays; atomic spectra; X-rays; physical electronics, and physics of solids.

THEORETICAL PHYSICS. Quantum mechanics; quantum electrodynamics; theory of nuclei; fundamental particles; radiation; and the theory of the solid state.

A colloquium in general physics and a seminar in theoretical physics meet regularly, and seminars in special fields meet as arranged.

A booklet entitled *Graduate Work in Physics at Cornell* can be obtained by writing to the Chairman, Department of Physics, Rockefeller Hall. The booklet contains additional information about graduate work and research in physics for the entering graduate student.

215. *PHYSICAL OPTICS.* Fall term. Credit three or five hours. Prerequisites, Physics 206, or equivalent, and calculus. Lectures, M W F 9. Laboratory, Th F 1:40–4:30, also T W 1:40–4:30 if a second section is warranted. Associate Professor HARTMAN.

225. *ELECTRICITY AND MAGNETISM.* Either term. Credit three hours. Prerequisite, Physics 117 or 206. Lectures, T Th S 9, and an optional problem period to be arranged. Fall term, Professor MURDOCK; spring term, Associate Professor MCDANIEL.

236. *ELECTRICITY AND MAGNETISM.* Spring term. Credit three hours. Prerequisites, Physics 225 and differential equations. Lectures, M W F 11. Associate Professor COCCONI.

242. *ANALYTICAL MECHANICS.* Spring term. Credit three hours. Prerequisites, Physics 205 or 208, and Mathematics 201, or their equivalents. T Th S 9. Assistant Professor WOODWARD.

243. *ATOMIC AND MOLECULAR PHYSICS.* Fall term. Credit three hours. Prerequisite, Physics 225 or consent of the instructor. M W F 10. Assistant Professor DEWIRE.

254. *ELECTRONIC PROPERTIES OF SOLIDS AND LIQUIDS.* Spring term. Credit three hours. Prerequisite, Physics 243. Lectures, T Th S 9. Professor SACK.

258. *MECHANICS OF CONTINUA.* Spring term. Credit three hours. Prerequisite, partial differential equations, or consent of instructor. T Th S 10. Professor SACK.

380. *ADVANCED LABORATORY.* Either term. Credit three hours. Prerequisite, Physics 210 or its equivalent. Laboratory, T W or Th F 1:40–4:30. Rockefeller 306. Professors PARRATT and CUYKENDALL, Associate Professors CORSON, HARTMAN, and MCDANIEL, and Assistant Professor WOODWARD.

[383. *X-RAY EXPERIMENTS.* Fall term. Credit two or three hours. Not offered in 1951–52.]

391. *ELECTRONICS AND IONICS.* Fall term. Credit three hours. Prerequisite, one term of Physics 380. Two laboratory periods and one seminar. Professor SPROULL.

393. *NUCLEAR PHYSICS LABORATORY.* Fall term. Credit two hours. Prerequisite, consent of instructor. Assistant Professor DEWIRE.

[396. *COSMIC RAY EXPERIMENTS.* Spring term. Credit two hours. Not offered in 1951–52.]

475. *THEORETICAL MECHANICS.* Fall term. Credit three hours. Prerequisite, Physics 242 or equivalent. T Th S 11. Professor BETHE.

476. *ELECTRODYNAMICS.* Spring term. Credit three hours. Prerequisite, Physics 225 or equivalent. T Th S 11. Associate Professor MORRISON.

477. *STATISTICAL MECHANICS AND KINETIC THEORY.* Fall term. Credit two hours. Prerequisites, Physics 475, and (or in parallel) Physics 485. T Th 9. Associate Professor MORRISON.

480. *THEORETICAL PHYSICS READING COURSE.* Fall term. Repeated in the spring term. Credit two hours. Hours to be arranged. Dr. SALPETER.

485. *INTRODUCTORY QUANTUM MECHANICS.* Fall term. Credit three hours. Prerequisites, Physics 475 and 476. T Th S 12. Associate Professor MORRISON.

486. *APPLICATIONS OF QUANTUM MECHANICS.* Spring term. Credit three hours. Prerequisite, Physics 485. T Th S 12. Professor BETHE.

491. *ADVANCED QUANTUM MECHANICS.* Fall term. Credit three hours. Prerequisite, Physics 486. Given upon sufficient demand. Hours to be arranged. Professor DYSON.

[588. *X-RAYS.* Spring term. Credit three hours. Not offered in 1951–52.]

681. *ADVANCED ELECTRON PHYSICS.* Fall term. Credit three hours. Prerequisites, Mathematics 201, Physics 225 and 391, or their equivalents. M W F 8. Associate Professor NEWHALL.

683. *THE THEORY AND PROPERTIES OF SOLIDS.* Fall term. Credit three hours. Prerequisite, Physics 485 or its equivalent. T Th S 11. Professor SMITH.

692. *ADVANCED ELECTRONICS LABORATORY.* Spring term. Credit three hours. Prerequisite, Physics 681. Hours to be arranged. Associate Professor SPROULL.

781. *NUCLEAR PHYSICS.* Fall term. Credit three hours. Prerequisites, Physics 243 and (or in parallel) Physics 485. M 9, F 9–11. Professor WILSON.

782. *THEORY OF NUCLEI.* Spring term. Credit two hours. Prerequisites, Physics 485 and 781, or its equivalent. M F 9. Professor DYSON.

784. *COSMIC RAYS.* Spring term. Credit three hours. Prerequisite, a course in Introductory Theoretical Physics. Lectures, T Th S 9. Professor GREISEN or Associate Professor COCCONI.

[786. *THEORY OF HIGH ENERGY PHENOMENA.* Spring term. Credit two hours. Not offered in 1951–52.]

020. *INFORMAL STUDY IN PHYSICS.* Either term. Reading or laboratory work in any branch of physics under the direction of a member of the staff. Hours to be arranged.

080. *INFORMAL STUDY IN PHYSICS.* Either term. Special reading or problem work done under the direction of a member of the Staff. Hours to be arranged.

090. *SPECIAL LABORATORY WORK.* Either term. Graduate laboratory work in any branch of physics under the direction of a member of the staff. Hours to be arranged.

AGRICULTURE

AGRICULTURAL ECONOMICS

Professors G. P. Scoville, E. G. Misner, F. A. Pearson, Leland Spencer, V. B. Hart, M. P. Rasmussen, F. F. Hill, M. S. Kendrick, M. C. Bond, S. W. Warren, L. C. Cunningham, G. W. Hedlund, T. N. Hurd, Herrell DeGraff, L. B. Darrah, E. A. Lutz, Max Brunk, C. A. Bratton, H. E. Conklin, C. D. Kearl, W. W. Burger, W. E. Earle.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Agricultural Economics 4
Business Management 1, 2, 3, 4
Farm Management 1, 2, 3, 4
Farm Finance 1, 2, 3, 4
Land Economics and Agricultural Geography 1, 2, 3, 4
Marketing 1, 2, 3, 4
Prices and Statistics 1, 2, 3, 4
Public Administration and Finance 1, 2, 3, 4

BUSINESS MANAGEMENT

Attention is directed to the courses in administrative engineering in the College of Engineering, in economics in the College of Arts and Sciences, and in administration in the Department of Hotel Administration.

121. *FINANCIAL STATEMENTS.* Fall term. Credit three hours. Dr. John W. Fitzgerald. Lectures, M W 11. Warren 201. Laboratory, M or T 2–4. Warren 201.

[122. *ACCOUNTING METHOD.* Spring term. Credit three hours. Two lectures and one laboratory period a week. Not given in 1951–52.]

126. *FARMERS' COOPERATIVES.* Fall term. Credit three hours. Professor Hedlund. Lectures, M W 10. Warren 25. Discussions: for graduate students, F 2–4. Warren 225.

127. *BUSINESS LAW.* Fall term. Credit three hours. Limited to upperclassmen. Mr. Allan H. Treman. Lectures, M W F 9, Rice 300. (Attention is called to a similar course in Hotel Administration, M W F 8.)

226. *RESEARCH METHODS AND PROBLEMS IN THE FIELD OF FARMERS' COOPERATIVES.* Fall term. Offered in alternate years. Credit two hours. Open to graduate students who have had Courses 126 and 240 or their equivalents. Professor Hedlund. Hours to be arranged. Warren 205.

FARM MANAGEMENT

102. *FARM MANAGEMENT.* Spring term. Credit five hours. Professor Warren. Lectures, M W F 10. Warren 25. Laboratory, F 4–6. Warren 101. On days when farms are visited laboratory period will be 2–6.

[105. *FARM LABOR.* Fall term. Credit three hours. Prerequisite, Course 102 or its equivalent. Professor Hurd. Lectures, T Th 11. Discussion T or Th 2–4. Warren 325. Not given in 1951–52.]

106. *PROBLEMS AND PRACTICE IN FARM MANAGEMENT CONSULT-*

ING SERVICE. Fall term. Credit two hours. Professor MISNER. Lectures, Th 10. Laboratory, Th 2–4. Warren 101.

203. *BUSINESS ORGANIZATION AND MANAGEMENT OF SUCCESSFUL NEW YORK FARMS.* Fall term. Credit four hours. Prerequisite, Course 102 or its equivalent. Professor SCOVILLE. F 2–4, S 8–10. Warren 140. Approximate transportation expenses for trips, $15.

207. *METHODS OF RESEARCH IN FARM MANAGEMENT.* Fall term. Credit two hours. Professor WARREN. Th 4–6. Warren 140.

FARM FINANCE AND FARM APPRAISAL

184. *FARM FINANCE.* Spring term. Credit three hours. Open to graduate students and to those undergraduate students who have passed Course 102 with a grade of 80 or better. Professor HEDLUND. Lectures, W F 8. Discussion, F 2–4. Warren 225.

187. *FARM APPRAISAL.* Fall term. Credit three hours. Professor WARREN. Lecture, T 10. Laboratory, T 1–5. Warren 101.

[284. *RESEARCH METHODS AND PROBLEMS IN FARM FINANCE.* Spring term. Offered in alternate years. Credit two hours. Open to graduate students who have had Courses 184 and 207 or their equivalents. Professors HILL and HEDLUND. F 4–6. Warren 205. Not given in 1951–52.]

LAND ECONOMICS AND AGRICULTURAL GEOGRAPHY

2. *AGRICULTURAL GEOGRAPHY.* Fall term. Credit four hours. Professor DEGRAFF. Lectures, M W F 9 or 11. Warren 25. Discussion, graduate students, F 4–6. Warren 325.

160. *FOOD ECONOMICS.* Spring term. Credit three hours. Professor DEGRAFF. Designed especially for students in the School of Nutrition and in the College of Home Economics. Not open to students in the College of Agriculture except by permission of the instructor. Lectures and discussion, M W F 8. Warren 325.

181. *AGRICULTURAL LAND ECONOMICS.* Spring term. Credit three hours. Primarily for juniors, seniors, and graduate students. For undergraduates, Courses 2 and 102 should precede or accompany this course. Assistant Professor CONKLIN. Lectures, T Th 8. Warren 125. Discussion and laboratory: primarily for graduate students, T 2–4; primarily for undergraduate students, Th 2–4. Warren 140. When field trips are taken, the laboratory period is from 1 to 5:30.

280. *SEMINAR IN AGRICULTURAL GEOGRAPHY.* Spring term. Credit two hours. Open only to graduate students. Registration by permission. Professor DEGRAFF. W 7:30 P.M. Warren 330.

281. *SPECIAL PROBLEMS IN AGRICULTURAL LAND ECONOMICS.* Fall or spring term. Credit one or more hours. Open only to graduate students. Registration by permission. Assistant Professor CONKLIN.

282. *INTRODUCTION TO METHODS OF RESEARCH IN AGRICULTURAL LAND ECONOMICS.* Spring term. Credit two hours. Open only to graduate students. Courses 181 and 207 and at least three hours of statistics should precede or accompany this course. Assistant Professor CONKLIN. S 10–12. Warren 101. One or more field trips, S 10–6.

MARKETING

140. *MARKETING.* Spring term. Credit three hours. Associate Professor DARRAH. Lectures F 11. Warren 25. Discussion, M T W or Th 2–4. Warren 225.

142. *MARKETING FRUITS AND VEGETABLES.* Fall term. Credit four hours. Professor RASMUSSEN. Lectures, M W F 9; Warren 225. Laboratory, W 2–4, Warren 25; or F 2–4, Warren 225 (Friday preferred for graduate students). Preregistration required.

143. *MARKETING DAIRY PRODUCTS.* Spring term. Credit four hours. Professor SPENCER. Lectures, M W F 9; Warren 225. Laboratory, Th or F 2–4 (Thursday preferred for graduate students); Warren 240. Field trips to visit dairy plants will be arranged in place of one or more laboratory meetings.

[144. *MARKETING POULTRY, EGGS, AND LIVESTOCK.* Spring term. Credit three hours. Associate Professor DARRAH. Lectures, T Th 10. Discussion, Th 2–4. Warren 225. Not given in 1951–52.]

[146. *DAIRY ORGANIZATION AND MANAGEMENT.* Spring term. Credit one hour. Professor SPENCER in charge. Lectures, T 11. Warren 225. Not given in 1951–52.]

147. *MARKETING TRIP TO NEW YORK CITY.* Spring term. Credit one hour. Enrollment limited. Associate Professors BRUNK and DARRAH. Total cost of the trip need not exceed $50 in addition to transportation to and from New York City.

240. *INTRODUCTION TO MARKETING RESEARCH.* Fall term. Credit two hours. Enrollment limited to graduate students. Associate Professor BRUNK. M 7:30 P.M. Warren 240.

[242. *CURRENT PROBLEMS IN THE MARKETING OF FRUITS AND VEGETABLES.* Fall term. Credit two hours. Limited to students who have done superior work in Course 142 or its equivalent. Registration by special permission. Professor RASMUSSEN. Not given in 1951–52.]

245. *RESEARCH IN MARKETING OF FRUITS AND VEGETABLES.* Fall term. Given in alternate years. Credit two hours. Open to graduate students who have had Course 142 or 240 or its equivalent. Professor RASMUSSEN and Associate Professor BRUNK. W 4–6. Warren 228.

[246. *RESEARCH IN MARKETING OF DAIRY PRODUCTS.* Spring term. Offered in alternate years. Credit two hours. Professor SPENCER. W 4–6. Warren 213. Consult instructor for permission to register. Not given in 1951–52.]

[247. *SEMINAR IN POULTRY AND LIVESTOCK MARKETING RESEARCH.* Spring term. Offered in alternate years. Credit two hours. Open to graduate students who have had Courses 144 and 240 or their equivalent. Associate Professor DARRAH. W 4–6. Warren 238. Not given in 1951–52.]

PRICES AND STATISTICS

Attention is directed to courses in mathematics and statistics in the Colleges of Arts and Sciences and Engineering, and in the School of Industrial and Labor Relations.

111. *STATISTICS.* Fall term. Credit three hours. Professor PEARSON. Lecture, M 8; Warren 125. Laboratory, M 2–4; Warren 25.

[112. *STATISTICS.* Spring term. Credit three hours. Prerequisite, Course 111. Professor PEARSON. Not given in 1951–52.]

115. *PRICES.* Spring term. Credit three hours. Professor PEARSON. Lectures, T Th 9. Laboratory, W 2–4. Warren 25.

[215. *PRICES.* Fall and spring terms. Credit one hour a term. Professor PEARSON. Prerequisite, Course 115. Not given in 1951–52.]

PUBLIC ADMINISTRATION AND FINANCE

Attention is directed to the courses in government and economics in the College of Arts and Sciences.

135. *LOCAL GOVERNMENT.* Fall term. Credit three hours. Associate Professor LUTZ. Lectures, T Th 9. Warren 125. Laboratory, Th 2–4. Warren 340.

138. *TAXATION.* Fall term. Credit three hours. Professor KENDRICK. Lectures, M W F 11. Plant Science 233.

236. *PROBLEMS IN PUBLIC ADMINISTRATION.* Fall term. Credit three hours. Associate Professor LUTZ. Time and room to be arranged.

502. *FEDERAL PUBLIC FINANCE.* Spring term. Credit three hours. Prerequisite, Taxation 138. Professor KENDRICK. M W F 11. Warren 225.

575. *SEMINAR IN PUBLIC FINANCE.* Spring term. Credit two hours. Prerequisite, graduate status with necessary preparation. Professor KENDRICK. Hours to be arranged. Warren 218.

AGRICULTURAL POLICY

251. *PUBLIC PROBLEMS OF AGRICULTURE.* Fall term. Credit two hours. Professor HILL. Lecture, W 8. Discussion, W 2–4. Warren 125.

DEPARTMENTAL SEMINAR

299. *SEMINAR.* Continues through fall and spring terms. Departmental Staff. M 4. Warren 401.

AGRICULTURAL ENGINEERING

Professors O. C. FRENCH, E. W. FOSS, A. M. GOODMAN, B. A. JENNINGS, C. W. TERRY, C. N. TURNER, F. B. WRIGHT; *Associate Professor* E. S. SHEPARDSON; *Assistant Professors* H. E. GRAY, L. L. BOYD, W. W. GUNKEL.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Farm Structures 1, 2, 3, 4
Farm Equipment 1, 2, 3, 4
Agricultural Engineering 1, 2, 3, 4
Engineering of Soil Management 1, 2, 3, 4

The laboratories of the Department are well equipped for the usual types of investigations in the fields listed. Special equipment can generally be supplied when needed.

Students desiring to undertake work in agricultural engineering should have, first of all, adequate grounding in the fundamentals of the phase studied and ability to perceive the applications of these fundamentals, since the applications of engineering practices to agriculture, though of great economic importance, are usually successful in proportion as they are direct and simple. Firsthand knowl-

edge of farm life and of rural conditions generally is most essential for some problems. Whether a student's preparation is adequate for any given line of advanced study can be determined only by special consideration of each case.

For undergraduate courses which often meet the needs of graduate students see the *Announcement of the College of Agriculture,* Department of Agricultural Engineering, Courses 101, 102, 103, 221, 21, 31, 32, 40, 41, 42, 43, Drawing 2.

203. *AGRICULTURAL MACHINERY DESIGN.* Fall term. Three hours. Professor TERRY. Prerequisites, engineering drawing, mechanics (statics, dynamics), strength of materials. Two lectures and one computing period a week, to be arranged.

231. *FARM STRUCTURES DESIGN.* Spring term. Three hours. Assistant Professors BOYD and GRAY. Prerequisite, Strength of Materials.

251. *RESEARCH IN AGRICULTURAL ENGINEERING.* Fall and spring term. One or more hours. Prerequisite, permission to register. Professors FRENCH, FOSS, GOODMAN, JENNINGS, TERRY, TURNER, and WRIGHT; Associate Professor SHEPARDSON; and Assistant Professors BOYD, GRAY, and GUNKEL. Hours as arranged.

252. *SEMINAR.* Required of graduate students. Both terms. Credit one hour a term. Professor FRENCH and Staff. T 12:30–1:30.

253. *SPECIAL TOPICS IN AGRICULTURAL ENGINEERING.* Fall term: Farm Structures; spring term: Soils and Water. Credit one hour. Open to graduate students and seniors by special permission. Professor GRAY. Time to be arranged.

AGRONOMY

Professors R. BRADFIELD, H. B. HARTWIG, R. B. MUSGRAVE, MICHAEL PEECH, M. G. CLINE, H. A. MACDONALD, M. B. RUSSELL, J. E. DAWSON, W. K. KENNEDY, N. C. BRADY, EARL STONE, PAUL ZWERMAN, D. J. LATHWELL, F. E. BROADBENT; at Geneva, *Professor* A. W. HOFER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Soils 1, 2, 3, 4 — Field Crop Production 1, 2, 3, 4

The laboratories of the Department are well equipped for chemical, physical, and microbiological investigations of soil and field crops. Greenhouses are available for soil and crop experimentation during the winter, and a field, conveniently located and well equipped, is available for experiments on a larger scale during the summer. Special equipment can generally be supplied when needed. The departmental library contains the more important journals, reference works, and experiment station literature.

Members of the staff will be especially interested in directing research in the field as listed: Professor BRADFIELD, in soil fertility; Professor PEECH in soil chemistry; Professor RUSSELL in soil physics; Professor CLINE in the morphology, classification, and cartography of soils; Professor BROADBENT in microbiology; Professor DAWSON in organic soils; Professor STONE in forest soils; Professor ZWERMAN in soil conservation; Professor BRADY in plant nutrition; Professor HARTWIG in field crop production; Professors KENNEDY and MACDONALD in pasture production and management; Professor MUSGRAVE in field crop ecology and grain production; and Professor LATHWELL in soil fertility and testing. Prospective students are urged to correspond with the member of the staff whose interests are most closely related to their own a few months in advance of the time they expect to enter upon their work, as only a limited number of students can be accommodated.

Students preparing for graduate work in agronomy are urged to obtain a thorough knowledge of general physics, mathematics through calculus, analytical, organic, and physical chemistry, general botany, bacteriology, genetics, plant physiology, and geology. Opportunity will be afforded for further study of some of these subjects after entering the Graduate School, but a student deficient in two or more of these foundation courses cannot expect to receive a degree in the minimum time required for residence. Some practical experience with soil and crop management problems is also desirable. Opportunity to acquire additional experience will be afforded a limited number of students majoring in the Department by summer employment on departmental projects.

Students must consult the professor in charge before registering for any course numbered above 100.

SOIL SCIENCE

1. *THE NATURE AND PROPERTIES OF SOILS.* Fall or spring term. Credit five hours. Preregistration required.

6. *SOILS.* Spring term. Credit three hours. Preregistration required.

101. *SOIL CLASSIFICATION AND SURVEY.* Spring term. Credit three hours. Prerequisite, Agronomy 1 or 6 or equivalent. Lectures T Th 10. Caldwell 100. Laboratory M or F 2–4:30. Caldwell 143. Field work replaces the laboratory as soon as weather permits; time to be arranged. Professor CLINE.

102. *SOIL AND WATER CONSERVATION.* Spring term. Credit three hours. Prerequisite, Agronomy 1 or 6 and 2 or 11, their equivalent, or permission of the instructor. Farm background desirable. Lectures, T Th 11. Caldwell 100. Laboratory F 2–4:30 or S 8–10:30. Professor ZWERMAN.

103. *ORGANIC SOILS.* Fall term. Credit two hours. Given in alternate years. Prerequisite, Agronomy 1. T Th 9. Caldwell 31. Professor DAWSON. Given in 1951–52.

[104. *FOREST SOILS.* Fall term. Credit two hours. Given in alternate years. Prerequisite, Agronomy 1 and Botany 31. Professor STONE. Occasional field trips. Transportation costs to be arranged. Not given in 1951–52]

[105. *SOIL AND CROP MANAGEMENT.* Fall term. Credit three hours. Primarily for advanced undergraduates and graduate minors in agronomy. Prerequisite, Agronomy 1 or 6 and 2 or 11, or permission of the instructor. Lectures, T Th 9. Laboratory, Th 2–4:30. Caldwell 143. Professor CLINE. A few field trips to near-by farms. Not given in 1951–52.]

106. *SOIL MICROBIOLOGY.* Fall term. Credit three hours. With the approval of the instructor, the lectures without the laboratory may be taken for two-hour credit. Prerequisite, Agronomy 1, except for students majoring in bacteriology, Bacteriology 1, and Chemistry 303 or its equivalent. Lectures, M W 8; Caldwell 143. Laboratory, F 2–4:30; Caldwell 201. Assistant Professor BROADBENT.

[107. *PHYSICAL EDAPHOLOGY.* Fall term. Credit three hours. Primarily for advanced undergraduates and graduate minors in agronomy. Prerequisite, Agronomy 1 or permission of the instructor. Given in alternate years. Lectures M W F 8. Caldwell 143. Professor RUSSELL. Not given in 1951–52.]

201. *SOIL CHEMISTRY, LECTURES.* Spring term. Credit three hours. Prerequisite, Agronomy 1 and qualitative and quantitative analysis. A course in physical chemistry is recommended. M W F 9. Caldwell 143. Professor PEECH.

202. *CHEMICAL METHODS OF SOIL ANALYSIS.* Spring term. Credit three hours. Prerequisite, Agronomy 1 and qualitative and quantitative analysis. Enrollment limited. T Th 2–4:30. Caldwell 294. Preregistration required. Professor PEECH.

203. *THE GENESIS, MORPHOLOGY, AND CLASSIFICATION OF SOILS.* Fall term. Credit three hours. Lectures, M W F 9. Caldwell 143. Given in alternate years. Given in 1951–52. Professor CLINE.

Two all-day Saturday field trips, one of which is optional and for which a fee of $3 will be collected from each student attending.

205. *SOIL FERTILITY, ADVANCED COURSE.* Fall term. Credit three hours. Prerequisite, Agronomy 1 and Chemistry 201 or its equivalent. Lectures, T Th S 8. Caldwell 143. Professor BRADFIELD.

207. *SOIL PHYSICS.* Fall term. Credit three hours. Primarily for graduate students. Prerequisite, Agronomy 107 or permission of the instructor. Lectures, M W F 8. Caldwell 143. Given in alternate years. Professor RUSSELL. Given in 1951–52.

208. *PHYSICAL PROPERTIES OF SOILS, LABORATORY.* Fall term. Credit three hours. Must be preceded or accompanied by Course 207. Enrollment limited. M W 2–4:30. Caldwell 294. Professor RUSSELL.

209. *RESEARCH IN SOIL SCIENCE.* Fall and spring terms. Professors BRADFIELD, PEECH, CLINE, RUSSELL, DAWSON, BRADY, STONE, BROADBENT, ZWERMAN, and LATHWELL.

210. *SELECTED TOPICS IN SOIL SCIENCE.* Fall and spring term. Credit one to three hours. Prerequisite, ten credit hours in soil science. Time to be arranged.

Topics for 1951–52 are:

Fall term: (a) Soil Moisture; Professor RUSSELL; one credit hour. (c) To be arranged; Staff; one to three credit hours.

Spring term: (a) Soil Structure; Professor RUSSELL; one credit hour. (b) Ionic Equilibria in Soils; Professor PEECH; one credit hour. (c) To be arranged; Staff; one to three credit hours.

FIELD CROPS

2. *INTRODUCTION TO FIELD CROPS.* Spring term. Credit three hours. Preregistration required.

11. *PRODUCTION OF FIELD CROPS.* Fall term. Credit four hours. Preregistration required.

112. *PASTURE AND HAY CROPS.* Spring term. Credit three hours. For juniors, seniors, and graduate students. Prerequisite, Agronomy 1 and 11 or 2 and 6 by permission. Lectures, T Th 8. CALDWELL 100. Laboratory and field trips, W or Th 2–4:30. Professor KENNEDY.

211. *SPECIAL TOPICS IN FIELD CROPS.* Spring term. Credit one to two hours. Topic 1951–52: Crop Preservation. Professors HARTWIG, KENNEDY, MACDONALD, MUSGRAVE. Meeting once weekly.

[213. *CROP ECOLOGY.* Fall term. Credit three hours. Prerequisites, Agronomy 11 and Botany 31 or their equivalent. Lectures, T Th S 10. Caldwell 31. Professor MUSGRAVE. Not given in 1951–52.]

214. *GRASSLANDS AND GRASSLAND RESEARCH.* Fall term. Credit three

hours. Prerequisite, Course 112, Plant Breeding 102 or 203 and Botany 31 or their equivalent, and permission to register. T Th S 10. Professor MACDONALD.

A study of factors underlying the development and maintenance of grassland types and the principles and practices of grassland and forage crop investigations.

219. *RESEARCH IN FIELD-CROP PRODUCTION.* Fall, spring, and summer terms. Professors HARTWIG, KENNEDY, MACDONALD, and MUSGRAVE.

DEPARTMENTAL SEMINAR

290. *SEMINAR.* Fall and spring terms. Required of graduate students taking work in the Department, S 11–12:30. Caldwell 143.

DAIRY SCIENCE

Professors J. M. SHERMAN, A. C. DAHLBERG, B. L. HERRINGTON, R. F. HOLLAND, H. B. NAYLOR, V. N. KRUKOVSKY, J. C. WHITE, F. V. KOSIKOWSKY, W. K. JORDAN, W. F. SHIPE, JR., R. P. MARCH.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Dairy Science 1, 2, 3, 4 Dairy Chemistry 1, 2, 3, 4

Before starting graduate work in dairy science, it is desirable that the student have general chemistry, qualitative and quantitative analysis, organic chemistry, college physics, and general bacteriology, in addition to the elementary courses in the particular field in which he wishes to do his graduate work.

Graduate students may elect research problems in any of the various fields of dairy science and in related fields of bacteriology and biochemistry.

Formal courses open to undergraduate and graduate students are given in the following subjects:

1. *INTRODUCTORY DAIRY SCIENCE.* Fall term. Credit three hours a week.

5. *TECHNICAL CONTROL OF DAIRY PRODUCTS.* Second term. Two hours a week.

102. *MARKET MILK.* Spring term. Credit five hours. Prerequisites, Course 1, and Bacteriology 1 or its equivalent. Professor HOLLAND. Lectures, M W 11; Laboratory, M W 2–5:30. Dairy Building 119 and 146. Preregistration required.

103. *MILK-PRODUCTS MANUFACTURING.* Fall term. Credit five hours. Prerequisite, Course 1. Professor KOSIKOWSKY. Lectures, recitations, and laboratory practice, T Th 11–4:30. Dairy Building 120. Preregistration required.

104. *MILK-PRODUCTS MANUFACTURING.* Spring term. Credit five hours. Prerequisite, Course 1; should be preceded or accompanied by Course 5. Professor JORDAN. Lectures, recitation, and laboratory practice, F 12–5, S 8–1. Preregistration required.

111. *ANALYTICAL METHODS.* Spring term. Credit four hours. Prerequisite, quantitative analysis. Professor HERRINGTON. Lectures, T Th 11. Laboratory practice, T 1–5. Dairy Industry Building 120. Preregistration required.

113. *CHEMISTRY OF MILK.* Fall term. Credit two hours. Prerequisites, qualitative and quantitative analysis and organic chemistry; must be preceded or accompanied by Course 1 or its equivalent. Professor HERRINGTON. Lectures, M W 8. Dairy Building 119.

DAIRY BACTERIOLOGY. (See Bacteriology 191.)

220. *CHEMISTRY OF MILK PRODUCTS.* Spring term. Credit four hours. Must be preceded by Course 113. Professor ——. Lectures, M T W Th 8. Dairy Building 218.

252. *SEMINAR.* Throughout the year. Without credit. Required of graduate students specializing in the department. Professor SHERMAN. Hours to be arranged. Dairy Building.

FLORICULTURE AND ORNAMENTAL HORTICULTURE

Professors L. H. MACDANIELS, KENNETH POST, J. F. CORNMAN, J. P. PORTER, A. M. S. PRIDHAM, W. E. SNYDER, ARTHUR BING, R. E. LEE.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Floriculture and Ornamental Horticulture 1, 2, 4

Studies in the propagation, nutrition, culture, and improvement of ornamental plants may be undertaken. Monographic studies of ornamental groups and their adaptability to use are also suitable problems.

Most of the problems in this field are basically those of plant response with relation to environment, and therefore the student majoring in the department should have adequate preparation in botany, plant physiology, genetics, biometry, agronomy, plant pathology, entomology, chemistry, and elementary floriculture and should have had experience in the growing and handling of horticultural material. Minor subjects should be chosen in the above-named basic science fields. A candidate for the Doctor's degree may find it expedient to arrange a joint major in floriculture and one of the basic science departments. Under these circumstances the problem would be worked out with horticultural material under the joint supervision of committeemen from the two departments.

The greenhouse, nursery, plant materials, and laboratory facilities of the Department are adequate for research in practically any phase of the field.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Floriculture and Ornamental Horticulture, Courses 1, 2, 5, 10, 12, 13, and 32. For courses 10, 12, 13, and 32, preregistration is required.

113. *WOODY-PLANT MATERIALS, ADVANCED COURSE.* Fall term. Credit two hours. Prerequisite, Course 13. Associate Professor CORNMAN. Lecture, T 9. Laboratory, T 2–4:30. Plant Science 29.

114. *TURF.* Spring term. Credit two hours. Prerequisite, Agronomy 1 and permission to register. Associate Professor CORNMAN. Given in alternate years. Offered 1951–52. Lecture, W 11; Plant Science 37. Laboratory, Th 2–4:30; Plant Science 29.

115. *PLANT PROPAGATION.* Fall term. Credit three hours. Prerequisites, Courses 12 and 13 and Botany 31 or their equivalent. Associate Professor SNYDER. Lectures, T Th 8; Plant Science 37. Laboratory, Th 2–4:30; Greenhouses.

215. *PLANT PROPAGATION, ADVANCED COURSE.* Fall term. Credit two hours. Associate Professor SNYDER. Given in alternate years. Offered in 1951–52. Hours by arrangement.

123. *FLORIST CROP PRODUCTION.* Fall term. Credit four hours. Prerequisites, Course 115, Botany 31, Agronomy 1, and the practice requirement. Professor POST. Lectures and recitation, M W F 9. Plant Science 37. Laboratory, M 2–4:30. Greenhouses.

124. *COMMERCIAL GREENHOUSE PRODUCTION.* Spring term. Credit three hours. Prerequisite, Course 123. Assistant Professor BING. Lectures, M W 9; Plant Science 37. Laboratory, W 2–4:30; Greenhouses.

117. *COMMERCIAL NURSERY MANAGEMENT.* Spring term. Credit three hours. Prerequisite, Course 115. Associate Professor PRIDHAM. Lectures T F 11; Plant Science 37. Laboratory, T 2–4:30; Greenhouses.

119. *PLANTING AND MAINTENANCE OF ORNAMENTAL PLANTS.* Fall term. Credit three hours. Prerequisite, Course 115. Associate Professor PRIDHAM. Lectures, T Th 11. Plant Science 37. Laboratory, W 2–4:30. Greenhouse.

125. *FLOWER STORE MANAGEMENT.* Spring term. Credit two hours. Prerequisites, Course 5 and permission to register. MISS HAKANSON. Lecture M 11; Plant Science 37. Laboratory, M 2–4:30; Plant Science 22.

132. *LANDSCAPE PLANNING AND PLANTING OF SMALL PROPERTIES.* Fall and spring terms. Credit four hours each term. Prerequisites, Courses 12, 113, and 32. Should be accompanied by Course 134 during fall term. Assistant Professor PIERCE and Associate Professor PORTER. Lecture, T 12; Plant Science 432. Laboratory, T Th 2–4:30 and one additional three-hour period; Plant Science 433.

134. *NURSERY-LANDSCAPE CONSTRUCTION AND ESTIMATING.* Fall term. Credit three hours. Intended for advanced students specializing in landscape services. Must be taken in conjunction with Course 132. Associate Professor PORTER. Lecture, Th 9. Laboratory, Th 10–12:30. Plant Science 433.

241. *SEMINAR.* Fall and spring terms. One hour to be arranged. Required of all graduate students in the Department.

POMOLOGY

Professors A. J. HEINICKE, M. B. HOFFMAN, R. M. SMOCK, DAMON BOYNTON, L. J. EDGERTON; at Geneva, *Professors* R. WELLINGTON, G. H. HOWE, G. L. SLATE, JOHN EINSET, N. J. SHAULIS, O. F. CURTIS, JR., R. C. LAMB, D. R. RODNEY.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Pomology 1, 2, 4

Laboratory, greenhouse, and orchard facilities at Ithaca and Geneva are available for graduate use. Opportunity for investigation of fruit storage problems is afforded by a cold storage plant that is equipped for experimental purposes.

Special facilities for research work in fruit breeding, nursery stock investigations, and other phases of pomology are also available at Geneva.

To enter upon graduate work in pomology, the student should have the equivalent of the following courses: general botany, elementary plant physiology, economic entomology, elementary plant pathology, introductory inorganic and elementary organic chemistry, elementary pomology, and systematic pomology. Students are required as part of their graduate work in pomology to take advanced courses in plant physiology, plant anatomy, cytology, and chemistry. They are urged to choose one minor in some phase of botany, particularly plant physiology.

Graduates studying for the Master's degree should spend one summer at Ithaca or Geneva or in the field investigating their special subject. This is expected of graduates working for a Doctor's degree.

For undergraduate courses, see the *Announcement of the College of Agriculture,* Department of Pomology, Courses 1, 102, 112. Preregistration required.

111. *HANDLING, STORAGE, AND UTILIZATION OF FRUIT.* Credit three hours. Fall term. Prerequisite, Pomology 1. Professor R. M. SMOCK. Lectures, T Th 8. Laboratory, Th or F 2–4:30. Preregistration required.

121. *ECONOMIC FRUITS OF THE WORLD.* Fall term, alternate years. Credit three hours. Prerequisites, Pomology 131 or premission to register. Professor BOYNTON. Lectures, M W 12. Laboratory, F 2–4:30. Given in 1951–52.

131. *ADVANCED POMOLOGY.* Fall term. Credit three hours. Prerequisites, Botany 31. Professor HOFFMAN. Lectures, M W F 9.

200. *SEMINAR.* Fall and spring terms. Members of the Staff. T 11. Plant Science 404.

201. *RESEARCH PROBLEMS IN POMOLOGY.* Fall and spring terms. Professors HEINICKE, HOFFMAN, SMOCK, BOYNTON, and EDGERTON.

231. *SPECIAL TOPICS IN EXPERIMENTAL POMOLOGY.* Spring term, alternate years. Credit three hours. Prerequisite, Pomology 131. Professors HOFFMAN, BOYNTON, and SMOCK; and Associate Professor EDGERTON. Conference periods, M W F 9.

POULTRY HUSBANDRY

Professors J. H. BRUCKNER, R. K. COLE, G. O. HALL, G. F. HEUSER, F. W. HILL, F. B. HUTT, L. C. NORRIS, A. L. ROMANOFF, M. L. SCOTT.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Animal Genetics 1, 2, 3, 4	Chemical Embryology 1, 2, 3, 4
Animal Nutrition 1, 2, 3, 4	Poultry Husbandry 2, 4

The Department provides excellent facilities for research in the genetics, physiology, incubation, embryology, nutrition, marketing, and behavior of domestic birds. A flock of more than 6,000 birds of various breeds of domestic fowl, ducks, and turkeys is maintained, and geese and game birds can be obtained when needed. There are a well-equipped chemical laboratory and complete facilities for work in poultry nutrition, equipment for studies of incubation, and facilities for various kinds of histological and physiological work.

For requirements and courses in Animal Nutrition see p. 81.

The prerequisites for graduate students electing a major subject in this field include some undergraduate training in poultry husbandry, some experience in that field, and courses in zoology or animal biology, physiology, and chemistry, as well as permission of the major adviser.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Poultry Husbandry. Preregistration is required.

120. *POULTRY GENETICS.* Spring term. Credit three hours. Prerequisites, Zoology 103–104, Plant Breeding 101, or equivalents, and permission of the instructor. Professor HUTT. M W F 9. Given in alternate years.

209. *SEMINAR IN POULTRY BIOLOGY.* Throughout the year. Members of departmental staff. F 4:15. Rice 201. Required of all graduate students in the Department.

210. *EXPERIMENTAL METHODS IN POULTRY NUTRITION.* Spring term. For details see Animal Sciences, Animal Nutrition.

219. *ANIMAL NUTRITION SEMINAR.* Spring term. For details see Animal Nutrition.

220. *SPECIAL TOPICS IN ANIMAL GENETICS.* Fall term. Credit one hour. Registration by permission. Professors HUTT and COLE. Hours to be arranged. Not given every year, but only when the number of qualified students warrants.

230. *AVIAN EMBRYOLOGY.* Spring term. Given in alternate years with Course 235. Credit two hours. Prerequisite, Biology 1, or Zoology 103–104 or the equivalent. Lecture and laboratory demonstration. Professor ROMANOFF. Hours to be arranged. Rice Hall.

[235. *THE AVIAN EGG.* Spring term. Credit two hours. Given in alternate years with Course 230. Prerequisite, Biology 1, or Zoology 103–104 or the equivalent, and permission of the instructor. Professor ROMANOFF. Lecture and laboratory. Hours by arrangement. Rice Hall. Not given in 1951–52.]

[239. *SPECIAL TOPICS IN CHEMICAL EMBRYOLOGY.* Fall term. Credit one hour. Registration by permission. Rice Hall. Professor ROMANOFF. Not given in 1951–52.]

VEGETABLE CROPS

Professors H. C. THOMPSON, PAUL WORK, ORA SMITH, G. J. RALEIGH, J. D. HARTMAN, A. J. PRATT, R. D. SWEET, H. M. MUNGER, W. C. JACOB, H. J. CAREW, J. H. ELLISON, and W. C. KELLY; at GENEVA, *Professors* C. B. SAYRE, W. T. TAPLEY, M. T. VITTUM.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Vegetable Crops 1, 2, 4

Research in vegetable crops is the application of fundamental scientific methods to the solution of problems in the growing and handling of vegetables. These problems may involve control of flowering and fruiting, use of organic growth regulators, determination of fertilizer requirements, adaptation of rapid tests for diagnosing nutrient deficiencies, development of objective methods for the determination of edible and market quality, physiological effects of various methods of harvesting, shipping, packaging, storing, and otherwise handling vegetables, control of physiological diseases, chemical and mechanical weed killers, and the like.

The facilities available include the usual classrooms and laboratories; research laboratories with equipment for chemical, physiological, and anatomical work; cold storage and common storage rooms; greenhouses (about 7,500 square feet) with heat controls; about 30 acres of land at Ithaca devoted to research and teaching and an additional 50 acres devoted to research on Long Island.

To enter upon graduate work in this field the student should have the equivalent of the following courses: Botany 1 and 31, Plant Pathology 1, Entomology 12, Agronomy 1, Vegetable Crops 1, 2, 112. These courses are outlined in the *Announcement of the College of Agriculture.* In case a student has not had all these courses, he should take them early in his period of graduate study. Students taking either a major or a minor in vegetable crops are required to take Courses 101, 113, 225, and to attend the seminar. Basic training in quantitative chemical analysis, organic chemistry, biological chemistry, physics and mathematics, through elementary analytical geometry or calculus, is highly desirable.

1. *VEGETABLE CROPS.* Spring term. Credit four hours. Preregistration required.

2. *SPECIAL CASH CROPS.* Spring term. Credit three hours. Botany 1 should precede or accompany this course. Preregistration required.

101. *ADVANCED VEGETABLE CROPS.* Fall term. Credit three hours. Prerequisites, Course 1 and Botany 31. Professor THOMPSON. Lectures, M W F 9. East Roberts 223. Preregistration required.

112. *POSTHARVEST HANDLING OF VEGETABLE CROPS.* Fall term. Credit four hours. Professor HARTMAN. Lectures, T Th 11; East Roberts 222. Laboratory, T or W 2–4:30; East Roberts 223. One two-day and three afternoon trips required. Estimated partial cost of transportation to be collected from the student, $2. Preregistration required.

[113. *TYPES AND VARIETIES OF VEGETABLES.* Fall term. Credit three hours. Alternate years. Prerequisites, Vegetable Crops 1 or 2 or permission. Professor ——. Lecture and laboratory F 2–4:30, East Ithaca Gardens and East Roberts 223. Preregistration required. Not given in 1951–52.]

225. *SPECIAL TOPICS IN VEGETABLE CROPS.* Spring term. Credit three hours. Prerequisites, Course 101 and Botany 31. It is recommended that Botany 231 and 232 precede or accompany this course. Professors THOMPSON, RALEIGH, SMITH, HARTMAN, and SWEET. East Roberts 223. Given in alternate years.

231. *RESEARCH.* Members of the Staff are prepared to direct investigations in the various lines of vegetable production and handling.

232. *SEMINAR.* Fall and spring terms. Credit one hour. Members of the department Staff. Recent literature is taken up for discussion and graduate thesis problems are reported. All graduate students in vegetable crops are required to take part in this seminar. Time to be arranged. East Roberts 223.

THE AGRICULTURAL SCIENCES AS PRESENTED IN THE NEW YORK STATE EXPERIMENT STATION AT GENEVA

A. J. HEINICKE, *Director*

Since July 1, 1923, the New York State Experiment Station at Geneva has been under the administration of Cornell University. Research workers on its staff are eligible for membership on the Faculty of the Graduate School, and its facilities for research are available to graduate students.

The station is equipped to care for graduate students in certain specific lines of research, viz., bacteriology, chemistry, economic entomology, plant pathology, pomology, seed investigations, and vegetable crops. Ample accommodations are available from the standpoint of laboratory facilities, reference library, etc., for research in the laboratory sciences. Greenhouses and also a farm of appoximately 500 acres are available for work with fruits and vegetables.

Certain phases of the investigations now being conducted at the Station and other problems for which the facilities of the Station are suitable may be used as thesis problems by graduate students.

Students who plan to do part of their graduate work at Geneva should correspond with the Dean of the Graduate School concerning special regulations as to residence credit, special committees, etc.

Members of the Faculty resident at Geneva are listed under the following departments: Agronomy, Bacteriology, Botany, Plant Breeding, Plant Pathology, Pomology, Vegetable Crops, Entomology and Limnology, and Biochemistry.

SCHOOL OF EDUCATION

EDUCATION AND RURAL EDUCATION

Professors T. L. Bayne, C. K. Beach, Sara Blackwell, J. M. Brophy, J. E. Butterworth, C. H. Crawford, R. H. Dalton, L. H. Elliott, L. A. Emerson, Jean Failing, F. S. Freeman, M. D. Glock, E. L. Gordon, Esther Harris, Helen Hoefer, E. R. Hoskins, M. Hutchins, W. R. Kunsela, J. P. Leagans, C. B. Moore, H. Moser, A. G. Nelson, E. L. Palmer, H. I. Patterson, W. A. Smith, F. H. Stutz, Ethel Waring, A. L. Winsor; *Deans* Lucile Allen and Frank Baldwin.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Agricultural Education 1, 2, 3, 4
Curriculum 1, 2, 3, 4
Education 3, 4
Educational Administration 1, 2, 3, 4 (including Statistics) 2, 3, 4
Educational and Mental Measurement 2, 3, 4
Educational Method 3, 4
Educational Psychology 1, 2, 3, 4
Extension Education 1, 2, 3, 4
Guidance and Personnel Administration 1, 2, 3, 4
History of Education 2, 3, 4
Home Economics Education 1, 2, 3, 4
Industrial Education 1, 2, 3, 4
Nature Study 1, 2, 3, 4
Rural Education 1, 3, 4
Rural Secondary Education 1, 2, 3, 4
Science Education 1, 2, 3, 4
Secondary Education 1, 2, 3, 4
Social Studies Education 1, 2, 3, 4
Supervision 1, 2, 3, 4
Theory and Philosophy of Education 1, 2, 3, 4
Vocational Education 1

Students in Education may become candidates for two types of advanced degrees: (1) the degrees of Master of Arts, Master of Science, Master of Science in Agriculture, Doctor of Education, and Doctor of Philosophy, administered by the Graduate School; (2) the degrees of Master of Science in Education and Master of Education, administered by the Graduate School under the special jurisdiction of the School of Education.

ADMISSION

A student may be admitted to candidacy for any of the degrees, Master of Arts, Master of Science, Master of Science in Agriculture, Doctor of Education, or Doctor of Philosophy, with a major or minor or both in some phase of Education.

The requirements for admission to candidacy for the Master of Science in Education degree are the same as those for the Master of Arts or Master of Science degrees, except that there is no requirement in foreign language.

Inquiries should be addressed to the Director of the School of Education. Formal application for admission should be sent to the Dean of the Graduate School.

THE DEGREE OF MASTER OF EDUCATION

The program for this degree is planned for students seeking an additional year of preservice preparation for teaching. Applicants who, as undergraduates, have

not completed professional requirements for certification to teach may do so by taking one year and one summer session of professional work leading toward this degree.

THE DEGREE OF MASTER OF SCIENCE IN EDUCATION

The various programs leading to this degree are planned primarily for those who, having had experience in teaching or other type of educational work, wish to prepare themselves for such specialized forms of service as supervision, counseling, or the administration of an elementary, secondary, vocational, or technical school. For the present, extension workers, teachers of industrial arts and of industrial and technical subjects should also ordinarily seek this degree. Information regarding requirements for admission to candidacy for this degree will be found in the *Announcement of the School of Education.*

For information regarding rooms and hours see the Announcements of the colleges concerned.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the School of Education,* Courses 10, 106, 107, 108, 111, 112, 117, 121, 128, 129, 130, 131, 132, 133, 134, 135, 136, 138, and 190; also, in the *Announcement of the College of Arts and Sciences,* courses in human growth and development (201–202) and sociology (101).

SECONDARY SCHOOL TEACHING

R.E. 200. *APPRENTICE TEACHING.* An eight-week period off campus to be arranged. Members of the Staff. May be required of a candidate for the M.Ed. degree. Prerequisite: satisfactory completion of the first four years of the five-year program, or the equivalent, or special permission.

R.E. 210. *SPECIAL PROBLEMS IN TEACHING.* Fall and spring term. Members of the Staff.

[R.E. 244. *PHILOSOPHY OF EDUCATION.* Spring term. Professor MOORE. S 9–10:40. Not given in 1951–52.]

Psych. 562. *SEMINAR IN HUMAN DEVELOPMENT AND BEHAVIOR.* Spring term. Professor FREEMAN. M 4–6.

NATURE STUDY AND SCIENCE TEACHING

[R.E. 202. *NATURE LITERATURE.* Fall term. Credit two hours. Open to graduate students and seniors interested in science and science teaching. Assistant Professor GORDON. M W 10. Not given in 1951–52.]

R.E. 203. *RESEARCH AND WRITING IN NATURE AND CONSERVATION EDUCATION.* Spring term. Credit two hours. Professor PALMER. T Th 10.

[R.E. 205. *THE TEACHING OF CONSERVATION.* Spring term. Credit two hours. Professor PALMER. T Th 10. Not given in 1951–52.]

R.E. 207. *METHODS AND MATERIALS FOR THE TEACHING OF SCIENCE IN SECONDARY SCHOOLS.* Spring term. Credit two hours. Registration by permission only. Mr. ECKERT. Hours to be arranged.

R.E. 209. *THE DEVELOPMENT OF NATURE AND SCIENCE EDUCATION IN THE UNITED STATES.* Fall term. Credit two hours. Open to graduate students and seniors interested in science teaching. Assistant Professor GORDON. M W 10.

R.E. 226. *RESEARCH IN SCIENCE TEACHING.* Fall or spring term. Credit one hour. Professor PALMER, Assistant Professor GORDON, and MR. ECKERT.

EDUCATIONAL PSYCHOLOGY

R.E. 211. *EDUCATIONAL PSYCHOLOGY.* Fall term. Credit three hours. For mature students with teaching experience. Professor GLOCK. M F 11–12:20.

R.E. 213. *PSYCHOLOGY OF LEARNING IN THE SCHOOL SUBJECTS.* Fall term. Credit two hours. Associate Professor BAYNE. S 9–10:30.

R.E. 218. *SEMINAR IN THE PSYCHOLOGY OF READING.* Spring term. Credit three hours. Professor GLOCK. Th 4–5:30.

R.E. 219. *SEMINAR IN PERSONNEL ADMINISTRATION IN EDUCATIONAL INSTITUTIONS.* Spring term. Credit two hours. For graduate students in Education. Professor WINSOR. Th 4–6.

Psych. 410. *INDIVIDUAL DIFFERENCES.* Spring term. Credit three hours. Prerequisite, Psychology 607 or equivalent, or consent of instructor. Professor FREEMAN. T Th 2–3:15.

EXTENSION EDUCATION

R.E. 223. *SEMINAR IN EXTENSION EDUCATION.* Fall or spring terms. Credit two hours each term. Open to graduate students in Extension Education and others with extension experience. Professor LEAGANS. W 4–5:30.

R.E. 224. *PROGRAM BUILDING IN EXTENSION EDUCATION.* Fall term. Credit two hours. For graduate students in Extension Education and others with extension experience. Professor LEAGANS. T 2–3:30.

R.E. 225. *TEACHING IN EXTENSION EDUCATION.* Spring term. Credit two hours. For graduate students in Extension Education and others concerned with teaching adults. Professor LEAGANS. T 2–3:30.

Courses suggested for additional basic work in this field:

Rural Education (211, 219, 244, 299)

Education (296)

Home Economics Education (437, 438, 459)

Rural Sociology (132, 203, 212, 218, 219)

Agricultural Economics (160, 181, 251)

Further selection from a broad range of University offerings may be made by the student to meet his special interests and needs.

AGRICULTURAL EDUCATION

R.E. 230. *SEMINAR IN AGRICULTURAL EDUCATION.* Spring term. Credit two hours. Assistant Professor KUNSELA. W 4–6.

[R.E. 231. *SUPERVISION IN VOCATIONAL AGRICULTURE.* Spring term. Credit two hours. Open to students with experience in vocational agriculture, or by permission. Associate Professor SMITH. T 11–1. Not given in 1951–52.]

R.E. 232. *EVALUATION AND PROGRAM PLANNING IN AGRICULTURAL EDUCATION.* Spring term. Credit two or three hours. Associate Professor HOSKINS and Mr. NOAKES. Th 4:15–6 and special trips to be arranged.

R.E. 233. *SUPERVISED FARMING PROGRAMS IN VOCATIONAL AGRICULTURE.* Spring term. Credit two hours. Associate Professor SMITH and Mr. NOAKES. T 2–5.

R.E. 234. *EDUCATION FOR LEADERSHIP OF FARM YOUTH AND ADULT GROUPS.* Fall term. Credit two or three hours. Associate Professor HOSKINS. F 4:15–6.

[R.E. 235. *THE PREPARATION OF TEACHERS IN VOCATIONAL AGRICULTURE.* Fall term. Credit two or three hours. Open to students with experience in vocational agriculture or by permission. Associate Professor SMITH. M 4:15–6. Not given in 1951–52.]

R.E. 236. *THE ORGANIZATION AND ADMINISTRATION OF VOCATIONAL AGRICULTURE IN THE SECONDARY SCHOOL.* Spring term. Credit two or three hours. Associate Professor HOSKINS. T Th 11–12:30.

[R.E. 237. *COURSES OF STUDY IN VOCATIONAL AGRICULTURE.* Fall term. Credit two hours. Associate Professor HOSKINS. T 4:15–6. Not given in 1951–52.]

R.E. 238. *MATERIALS OF INSTRUCTION IN VOCATIONAL AGRICULTURE.* Fall term. Credit two hours. Open to students with experience in teaching vocational agriculture. Assistant Professor KUNSELA. M 7:15–9 P.M.

R.E. 239. *PREVOCATIONAL AGRICULTURE IN THE SECONDARY SCHOOL.* Spring term. Credit two hours. Associate Professor SMITH. F 4:15–6.

SUPERVISION

[R.E. 241. *THE PREPARATION OF TEACHERS FOR NORMAL SCHOOLS AND COLLEGES.* Spring term. Credit two hours. Professor MOORE. Not given in 1951–52.]

R.E. 243. *PROCEDURES AND TECHNIQUES IN SUPERVISION.* Fall term. Credit three hours. Professor MOORE. M W F 10.

R.E. 245. *SEMINAR FOR PRINCIPALS.* Fall term. Credit two hours. Required of all graduate students who are candidates for a principal's certificate. Professor MOORE. S 9–10:40.

[R.E. 246. *THE SUPERVISION OF THE ELEMENTARY SCHOOL.* Spring term. Credit three hours. Candidates for a principal's certificate may register for two hours' credit. Professor MOORE. T Th S 2–3:30. Not given in 1951–52.]

[R.E. 247. *SEMINAR IN ELEMENTARY EDUCATION.* Spring term. Credit three hours. Professor MOORE. Not given in 1951–52.]

APTITUDE AND ACHIEVEMENT TESTS

R.E. 251. *EDUCATIONAL MEASUREMENT.* Spring term. Credit three hours. Candidates for the principal's certificate may register for two hours' credit. Prerequisite, a course in educational psychology. Associate Professor BAYNE. S 11–12:30 and an additional hour to be arranged.

R.E. 253. *INTRODUCTION TO EDUCATIONAL STATISTICS.* Fall term. Credit three hours. Associate Professor BAYNE. T Th 10 and an hour to be arranged.

[R.E. 254. *STATISTICAL INSTRUMENTS IN EDUCATION.* Spring term. Credit two hours. Prerequisite, a first course in statistics and permission of the instructor. Associate Professor BAYNE. T 10 and a period to be arranged. Not given in 1951–52.]

R.E. 255. *USE AND INTERPRETATION OF TESTS IN GUIDANCE AND PERSONNEL ADMINISTRATION.* Fall term. Credit two hours. Open to students in guidance or personnel administration. Professor WINSOR. Th 4–6.

Psychology 351. *PSYCHOLOGICAL TESTS I:* Tests of intelligence and specific aptitudes. Fall term. Credit three hours. Not open to sophomores. Prerequisite, a course in psychology and a course in statistics; or consent of the instructor. T Th S 9. Professor FREEMAN.

Psychology 352. *PSYCHOLOGICAL TESTS II:* Tests of personality and social behavior, and projective methods. Spring term. Credit three hours. Prerequisite, Psychology 607 or consent of the instructor. T Th S 9. Professor FREEMAN.

ADMINISTRATION, SECONDARY EDUCATION, AND CURRICULUM

R.E. 261. *FUNDAMENTALS OF EDUCATIONAL ORGANIZATION AND ADMINISTRATION.* Fall term. Credit three hours. Professor BUTTERWORTH. T Th 11–12:30. Candidates for a state administrative certificate must register also for Course R.E. 400.

R.E. 262. *THE SECONDARY SCHOOL PRINCIPALSHIP.* Spring term. Credit two hours. Associate Professor ELLIOTT. Th 2–4.

[R.E. 263. *THE PRINCIPALSHIP OF THE ELEMENTARY SCHOOL.* Professor MOORE. Not given in 1951–52.]

R.E. 264. *FINANCIAL POLICIES AND PRACTICES IN PUBLIC SCHOOLS.* Fall term. Credit two hours. Prerequisite, R.E. 261 or equivalent. Professor BUTTERWORTH. T 4:15–5:45.

R.E. 265. *THE SCHOOL PLANT.* Spring term. Credit two hours. Prerequisite, R.E. 261 or equivalent. Professor BUTTERWORTH. S 11–12:30.

[R.E. 267. *THE LEGAL PROBLEMS OF THE SCHOOL ADMINISTRATOR.* Mr. ——. Not given in 1951–52.]

R.E. 268. *SEMINAR IN RURAL SCHOOL ADMINISTRATION.* Fall term. Professor BUTTERWORTH. S 11–12:30. Topic to be announced.

[R.E. 269. *SEMINAR IN CITY SCHOOL ADMINISTRATION.* Spring term. Special lecturer. S 9–10:30. Not given in 1951–52.]

R.E. 276. *PRINCIPLES OF CURRICULUM BUILDING.* Fall term. Credit two or three hours. Associate Professor ELLIOTT. W 4–6 and one hour to be arranged for those enrolled for three hours' credit.

R.E. 277. *SEMINAR IN CURRICULUM.* Fall term. Credit two hours. Prerequisite, R.E. 276 or equivalent. Associate Professor ELLIOTT. S 11–12:30.

R.E. 278. *SEMINAR IN RURAL SECONDARY EDUCATION.* Spring term. Credit two hours. Associate Professor ELLIOTT. F 2–3.30.

R.E. 290. *SECONDARY EDUCATION.* Fall term. Credit three hours. Associate Professor ELLIOTT. M W F 9.

GUIDANCE AND PERSONNEL ADMINISTRATION

Ed. 280. *STUDENT PERSONNEL ADMINISTRATION.* Fall and spring terms. Credit two, three, or four hours. Graduates only. Prerequisite, consent of the instructor. Dean LUCILE ALLEN, Dean F. C. BALDWIN, and assistants, T 9–11. Conference Room. Administration Building.

Ed. 281. *SEMINAR IN STUDENT PERSONNEL ADMINISTRATION.* Throughout the year. Credit four hours. Graduates only. Students will be admitted upon consultation with the instructor. Dean LUCILE ALLEN and assistant.

R.E. 282. *EDUCATIONAL AND VOCATIONAL GUIDANCE.* Fall term. Credit two hours. For graduate students. S 9–10:40. Associate Professor NELSON.

[R.E. 283. *COUNSELING METHODS.* Spring term. Credit four hours. For graduate students. Prerequisites, Courses 255 and 282, or equivalents. Associate Professor NELSON. T Th 4:15–6:00. Not given in 1951–52.]

[R.E. 284. *GROUP TECHNIQUES IN GUIDANCE.* Spring term. Credit two hours. Associate Professor NELSON. M 4:15–6:00. Not given in 1951–52.]

R.E. 285. *OCCUPATIONAL AND EDUCATIONAL INFORMATION.* Fall term. Credit four hours. Associate Professor NELSON. T Th 1:00. Field trips on Wednesday afternoons.

[R.E. 289. *SUPERVISED PRACTICE IN TESTING AND COUNSELING.* Spring term. Credit three hours. For advanced graduate students only. Prerequisites, 255, 282, 283 (or their equivalent) and permission of the instructor. Associate Professor NELSON. W 5:00. Hours for observation and practice to be arranged. Not given in 1951–52.]

Psych. 411. *PROCEDURES IN CLINICAL CHILD GUIDANCE.* Fall term. Credit three hours. Prerequisite, Psychology 607 or equivalent. All students must have consent of the instructor. Profesor FREEMAN. M 4–6, and conferences.

GENERAL

[R.E. 194. *PRINCIPLES OF VOCATIONAL EDUCATION.* Spring term. Credit two hours. Associate Professor SMITH. T 4:15–6. Not given in 1951–52.]

R.E. 199. *INFORMAL STUDY IN EDUCATION.* Maximum credit three hours each term. Members of the Staff.

R.E. 291. *THE EDUCATIONAL PROGRAM FOR UNDEVELOPED COMMUNITIES.* Spring term. Credit two hours. Associate Professor ELLIOTT. T 4–5:30.

Ed. 292. *SEMINAR IN SOCIAL STUDIES EDUCATION.* Fall or spring term. Associate Professor STUTZ. T 4:15.

[R.E. 295. *COMPARATIVE EDUCATION.* Fall term. Professors BUTTERWORTH and MOORE. Not given in 1951–52.]

[Ed. 296. *HISTORY OF AMERICAN EDUCATION.* Spring term. Credit three hours. Associate Professor STUTZ. M W F 9. Not given in 1951–52.]

Ed. 297. *HISTORY OF EDUCATION IN THE MODERN PERIOD.* Spring term. Credit three hours. Associate Professor STUTZ. M W F 9.

R.E. 298. *SEMINAR IN RURAL EDUCATIONAL LEADERSHIP.* Spring term. Professor BUTTERWORTH and others. T Th 11–12:30.

R.E. 400. *INTERNSHIP IN EDUCATION.* Throughout the year. Credit two to six hours as arranged. Members of the Staff.

ADULT AND HIGHER EDUCATION

R.E. 214. *COLLEGE TEACHING.* Fall term. Credit two hours. Associate Professor ELLIOTT and others. M 7–9 P.M.

[R.E. 293. *ADULT EDUCATION.* Associate Professor HOSKINS. Not given in 1951–52.]

R.E. 401. *PROBLEMS IN HIGHER EDUCATION.* Spring term. Professor BUTTERWORTH, Professor PETRY, and others. T 4:15–5:45.

RESEARCH

R.E. 299. *EDUCATIONAL RESEARCH METHODS AND TECHNIQUES.* Fall term. Credit two hours. For graduate students preparing for or engaged in research in education. Associate Professor SMITH. M 4:15–6.

R.E. 300. *SPECIAL STUDIES.* Credit as arranged. Members of the Staff. Students working on theses or other research projects may register for this course. The staff members concerned must be consulted before registration.

Ed. 500. *SPECIAL STUDIES.* Credit as arranged. Members of the Staff. Students working on theses or other research projects may register for this course. The staff members concerned must be consulted before registration.

HOME ECONOMICS EDUCATION

See Home Economics, pp. 165–166.

INDUSTRIAL AND TECHNICAL EDUCATION

See Industrial and Labor Relations, pp. 172–176.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS

See Home Economics, pp. 160–162.

ENGINEERING

S. C. HOLLISTER, *Chairman*

The Engineering Division of the Graduate School consists of all professors, associate professors, and assistant professors of the College of Engineering, the Dean of the Graduate School, and such other members of the Faculty of the University as have supervision of the work of graduate students in the Division.

COMMITTEES ON GRADUATE WORK

For each of the degrees (Aero.E., Chem. and Met.E., C.E., E.E., E.P., and M.E.) of the Division, a committee on graduate work has direct charge of the following: examining credentials of applicants for admission, which, however, must first be sent to the Dean of the Graduate School;* corresponding with applicants; registration of students in the subdivision, after they have registered in the Graduate School; giving advice regarding the student's program and the selection of his Special Committee; looking after the completion of undergraduate shortages; and checking the fulfillment of all scholastic requirements for the degrees. The membership of the committees on graduate work is as follows:

AERONAUTICAL ENGINEERING — W. R. SEARS, *Chairman,* 269 Aeronautical Engineering Building; J. M. WILD, *Secretary,* 256 Aeronautical Engineering Building.

CHEMICAL AND METALLURGICAL ENGINEERING — F. H. RHODES, *Chairman,* 124 Olin Hall; C. C. WINDING, *Secretary,* 228 Olin Hall; C. W. MASON, 318 Olin Hall.

CIVIL ENGINEERING — N. A. CHRISTENSEN, *Chairman,* 122 Lincoln Hall; R. Y. THATCHER, *Secretary,* 308 Lincoln Hall; M. BOGEMA, 234 Temporary Building.

ELECTRICAL ENGINEERING — C. R. BURROWS, *Chairman,* 107 Franklin Hall; J. G. TARBOUX, *Secretary,* 105 Franklin Hall; A. B. CREDLE, M–207 Franklin Hall.

MECHANICAL ENGINEERING — H. J. LOBERG, Chairman, 15 West Sibley; L. L. OTTO, *Secretary,* Mechanical Laboratory; A. SCHULTZ, JR., 23 West Sibley.

ENGINEERING PHYSICS — LLOYD P. SMITH, *Chairman,* 120 Rockefeller Hall; A. B. CREDLE, M-207 Franklin Hall; H. S. SACK, 156 Rockefeller Hall.

ENGINEERING MECHANICS AND MATERIALS — D. F. GUNDER, *Chairman,* 304 West Sibley.

ADVANCED DEGREES OFFERED

The degrees of Master of Chemical Engineering (M.Chem.E.) Master of Civil Engineering (M.C.E.), Master of Electrical Engineering (M.E.E.), Master of Mechanical Engineering (M.M.E.), Master of Metallurgical Engineering (M.Met.E), Master of Engineering Physics (M.E.P.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) are granted in the field of engineering.

THE DEGREE M.AERO.E.

The degree Master of Aeronautical Engineering (M.Aero.E.) is administered by the Faculty of the Graduate School of Aeronautical Engineering. Candidates for this degree are not admitted to the Graduate School of the University. Infor-

*Except in the case of candidates for the degree M.Aero.E. (see p. 139.)

mation regarding the requirements for this degree will be found in the *Announcement of the College of Engineering.*

ADMISSION

If the applicant wishes to become a candidate for one of the advanced engineering degrees his credentials should include not only information requested on page 8, but in addition (a) a statement showing, if possible, his relative standing in his class, (b) a catalogue of the institution from which he was graduated, with each subject that he has completed clearly marked therein, and (c) a detailed statement concerning his practical experience, together with letters from his employers. In all cases, the applicant should designate as definitely as possible his chosen field of study, both major and minor, so that he may be advised concerning the facilities and personnel available in those fields.

Candidacy for M.Chem.E., M.C.E., M.E.E., M.Met.E., M.E.P. or M.M.E. presupposes graduation from a school or college of recognized standing, with work, either prior to or subsequent to the Bachelor's degree, which is equivalent to a recognized curriculum in engineering and which is adequate preparation for the field chosen for graduate work. A shortage, which does not exceed six university credit hours, may be made up as extra work. If an applicant's total shortage is more than six hours, he may be required, and if more than eighteen hours he will be required, to enter an undergraduate school, and pay the undergraduate fees.

No applicant will be admitted to the Graduate School for work in engineering unless he is in at least the upper half of his class. Exception may be made when an applicant can present further evidence which would demonstrate his fitness to carry on graduate work.

When a student's Special Committee considers that a reading knowledge of French or German or both is essential for satisfactory progress in his particular fields of study, the student will be required to demonstrate such knowledge before proceeding with his study.

An applicant who does not care to meet the requirements either for entrance to candidacy for or graduation with an advanced degree may arrange for a program of work as a noncandidate, provided only that he has had previous training which is adequate for advanced study in the fields of engineering in which he desires to work.

A student whose mother tongue is other than English may be required by the committee on graduate work to furnish satisfactory evidence of his ability to speak, write, and read English to a degree sufficient for satisfactory progress in his graduate work.

REGISTRATION

A graduate student in engineering must, at the beginning of each term of residence, register first in the Graduate School and then at the office of the Engineering School of whose Faculty his major professor is a member.

Preregistration is required for all courses.

Graduate students in engineering will find among the regular and elective courses given in the College and in the mathematics, physics, chemistry, and other departments of the University, many subjects suitable for advanced study. For the courses offered, and for the laboratory, library, and other facilities in engineering, see the *Announcement of the College of Engineering.*

FIELDS OF GRADUATE INSTRUCTION

A candidate for the degrees of M.Chem.E., M.Met.E., M.C.E., M.E.E. M.M.E., M.E.P. must select his major field from the list given below. He will be allowed considerable latitude in the selection of his minor field or fields, and any field may be chosen which includes a sufficient amount of graduate work, provided his entire program shows a unified purpose. Candidates for degrees of M.S. and Ph.D. may also select major and minor subjects from this list (key to symbols on p. 43).

IN CHEMICAL ENGINEERING AND METALLURGICAL ENGINEERING

Chemical Engineering 1, 2, 4

Metallurgical Engineering 1, 2, 4

IN CIVIL ENGINEERING

Drawing and Cartography 4
Hydraulic Engineering 1, 2, 3, 4
Hydraulics
  Theoretical 1, 2, 3, 4
  Experimental 1, 2, 3, 4
Management Engineering 1, 2, 3, 4
Sanitary Engineering 1, 2, 3, 4
  Sewage Treatment 2, 3, 4
  Water Purification 2, 3, 4
Soil Mechanics 1, 2, 3, 4
Structural Engineering
  Structural Engineering 1, 2, 3, 4
  Theory of Structures 1, 2, 3, 4
Surveying
  Geodetic Engineering 1, 2, 3, 4
  Photogrammetric Engineering 1, 2, 3, 4
  Topographic Engineering 1, 2, 3, 4
Transportation Engineering 1, 2, 3, 4
  Airway Engineering 2, 3, 4
  Highway Engineering 2, 3, 4
  Railway Engineering 2, 3, 4

IN ELECTRICAL ENGINEERING

Electric Power System Engineering
  Transmission and Distribution 1, 2, 3, 4
  System Stability 1, 2, 3, 4
  Economics of Utilities 2, 3, 4
  High Voltage Engineering 2, 3, 4
  Power Generation 2, 3, 4
  Relaying and Control 2, 3, 4
Electric Power Utilization and Control
  Electrical Machinery 1, 2, 3, 4
  Industrial Control and Applications 1, 2, 3, 4
  Industrial Electronics 1, 2, 3, 4
  Illuminating Engineering 2, 3, 4
  Servomechanisms 1, 2, 3, 4
Communication Engineering
  Communication Systems 1, 2, 3, 4
  Electron Tubes 1, 2, 3, 4
  Electromagnetism 1, 2, 3, 4
  Microwave Engineering 1, 2, 3, 4
  Economics of Communication Services 2, 3, 4
  Wire Transmission 2, 3, 4
  Radio Engineering 1, 2, 3, 4
  Radio-Wave Propagation 1, 2, 3, 4
  Acoustical Engineering 2, 3, 4
  Carrier Systems 2, 3, 4
General
  Electric-Circuit Analysis 1, 2, 3, 4
  Electrical Measurements 1, 2, 3, 4
  Materials in Electrical Engineering 2, 3, 4

IN MECHANICAL ENGINEERING

Administrative Engineering 1, 2, 3, 4
Automotive Engineering 1, 2, 4
Engineering Drawing 1, 2, 3, 4
Heat-Power Engineering 1, 2, 3, 4
Industrial Engineering 1, 2, 3, 4
Machine Design 1, 2, 3, 4
Materials Processing 1, 2, 3, 4

IN AERONAUTICAL ENGINEERING

Aeronautical Engineering 1, 3, 4
Aerodynamics 4

IN ENGINEERING PHYSICS

Engineering Physics 1, 2, 4

IN ENGINEERING MECHANICS

Mechanics 1, 2, 3, 4
Fluid Mechanics 1, 2, 3, 4

IN ENGINEERING MATERIALS

Materials of Engineering 1, 2, 3, 4

AERONAUTICAL ENGINEERING

Professors A. R. KANTROWITZ, W. R. SEARS; *Associate Professor* J. M. WILD; *Assistant Professors* Y. H. KUO, C. RIPARBELLI.

Application for admission to candidacy for the degree M.Aero.E. should be made directly to the Director of the Graduate School of Aeronautical Engineering, College of Engineering, Cornell University. A special application blank for this purpose can be obtained from the office of the Director. This degree is awarded upon satisfactory completion of a required curriculum of studies and an acceptable thesis. For further details, see the *Announcement of the College of Engineering.*

Students who desire to work for the Ph.D. degree with aeronautical engineering as their major subject must be admitted to the Graduate School of the University in the usual manner. They should make application to the Dean of the Graduate School. Such candidates will be expected to complete courses and original research in the scientific fields that constitute the backgrounds of aeronautics, such as mechanics, fluid dynamics, and structural theory.

Close contact is maintained between the Graduate School of Aeronautical Engineering at the University and the Cornell Aeronautical Laboratory in Buffalo, N.Y. Certain periods of employment at the Laboratory are usually offered to aeronautical engineering students – ordinarily during their summer vacations. It is also possible that certain experimental equipment of that Laboratory will occasionally be available to graduate students in connection with their original research.

The Graduate School of Aeronautical Engineering is equipped with laboratories on the campus for fundamental research in fluid mechanics, aerodynamics, and structures.

GRADUATE COURSES

7101. *AIRPLANE MECHANICS.* Fall term. Credit four hours. Prerequisite: engineering mechanics. Associate Professor WILD.

7102. *AIRPLANE MECHANICS.* Spring term. Credit four hours. Prerequisite: 7101. Associate Professor WILD.

7203. *AERODYNAMICS OF POWER PLANTS.* Fall term. Credit three hours. Prerequisites, 7101, physics. Associate Professor WILD. Preregistration required.

7204. *GASDYNAMICS.* Spring term. Prerequisites: physics, integral calculus, engineering thermodynamics. Professor KANTROWITZ. Credit four hours.

7205. *KINETIC THEORY.* Fall term. Prerequisites: physics, integral calculus, engineering thermodynamics. Professor KANTROWITZ. Credit two hours.

7301. *THEORETICAL AERODYNAMICS I.* Six hours a week throughout the first half of the fall term. Credit three hours. Prerequisites, Mathematics 611 and 612 or equivalent, engineering mechanics or analytical mechanics. Professor SEARS.

7302. *THEORETICAL AERODYNAMICS II.* Spring term. Credit three hours. Prerequisite, 7301. Professor SEARS.

7303. *THEORETICAL AERODYNAMICS III.* Six hours a week throughout the second half of the fall term. Credit three hours. Prerequisites, 7201, 7202, 7301. Professor SEARS.

7304. *THEORETICAL AERODYNAMICS IV.* Spring term. Credit three hours. Prerequisite, 7301. Assistant Professor KUO. Preregistration required.

7305. *AERODYNAMICS OF COMPRESSIBLE VISCOUS FLUIDS.* Fall term. Credit two hours. Prerequisite, 7304. Assistant Professor KUO.

7401. *AIRPLANE STRUCTURES.* Fall term. Credit three hours. Prerequisite, strength of materials. Assistant Professor RIPARBELLI.

7402. *AIRPLANE STRUCTURES.* Spring term. Credit three hours. Prerequisite, 7401. Assistant Professor RIPARBELLI.

7403. *AIRPLANE DESIGN.* Fall term. Credit one hour.

7404. *AIRPLANE DESIGN.* Spring term. Credit one hour.

7405. *AERO-ELASTIC PROBLEMS.* Spring term. Credit three hours. Prerequisites, 7101, 7102. Preregistration required.

7406. DYNAMICS OF AIRPLANE STRUCTURES. Fall term. Credit two hours. Assistant Professor RIPARBELLI.

7801. *RESEARCH IN AERONAUTICAL ENGINEERING.* Credit to be arranged. Prerequisites, admission to the Graduate School of Aeronautical Engineering and approval of the Director.

7901. *AERONAUTICAL ENGINEERING COLLOQUIUM.* Each term. Credit one hour. T 4:30–6.

7902. *ADVANCED SEMINAR IN AERONAUTICS.* Each term. Credit two hours. Prerequisite, approval of the Director.

AGRICULTURAL ENGINEERING

See Agriculture, above.

AUTOMOTIVE ENGINEERING

Associate Professor L. L. OTTO.

Special problems related to automotive engineering may be selected for advanced study. Laboratory facilities are available for research on internal combustion engines or on chassis components; and arrangements may be made for

investigations on other automotive topics. Students desiring to take a minor in this field may find Courses 3741, 3743, and 3750 suitable as a foundation.

3741. *AUTOMOTIVE ENGINEERING.* Fall term. Credit three hours. Prerequisite, 3353.

3743. *AUTOMOTIVE COMPUTATIONS.* Spring term. Credit two hours. Prerequisite, 3741.

3750. *ADVANCED AUTOMOTIVE ENGINEERING.* Each term. Credit two to five hours as arranged. Permission of instructor required for registration.

CHEMICAL AND METALLURGICAL ENGINEERING

Professors J. L. GREGG, J. E. HEDRICK, P. E. KYLE, C. W. MASON, F. H. RHODES, C. C. WINDING; *Associate Professors* M. S. BURTON, J. C. SMITH, R. L. VON BERG, H. F. WIEGANDT.

To qualify for admission as a candidate for the degree of M.Chem.E., a student must hold the degree of B.Chem.E., or the equivalent thereof, and must have completed satisfactorily a course substantially equivalent in technical content to the course leading to the degree of B.Chem.E., at Cornell University. To qualify for admission as a candidate for the degree of M.Met.E., a student must hold the degree of B.Met.E., or the equivalent thereof, and must have completed satisfactorily a course substantially equivalent in technical content to the course leading to the degree of B.Met.E. at Cornell University.

The work for the thesis for the degree of M.Chem.E. may be in the specific fields of:

UNIT OPERATIONS
UNIT PROCESSES
CHEMICAL ENGINEERING DESIGN
CHEMICAL ENGINEERING ECONOMICS
CHEMICAL ENGINEERING THERMODYNAMICS
CHEMICAL PROCESS DESIGN

The work for the thesis for the degree of M.Met.E. may be in the specific fields of:

PROCESS METALLURGY
PHYSICAL METALLURGY
METAL PROCESSING
METAL CASTING
CORROSION

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Engineering,* School of Chemical and Metallurgical Engineering, Courses 1255, 1256, 5203, 5204, 5303, 5304, 5353, 5354, and 6811. Preregistration is required for these courses.

5103. *CHEMICAL ENGINEERING THERMODYNAMICS.* Fall term. Credit three hours. Prerequisite, Chemistry 404. Mr. VON BERG.

5104. *CHEMICAL ENGINEERING THERMODYNAMICS.* Fall term. Credit two hours. Prerequisite, Chemical Engineering 5103. Mr. VON BERG. Lectures. Continuation of Course 5103.

5106. *CHEMICAL ENGINEERING KINETICS.* Credit two hours. Prerequisite, Engineering 5104. Mr. VON BERG.

5503. *CHEMICAL ENGINEERING COMPUTATIONS.* Fall term. Credit two hours. Conferences and lectures. Prerequisite, Course 5303. Mr. WINDING.

5504. *CHEMICAL ENGINEERING COMPUTATIONS.* Spring term. Credit two hours. Conferences and lectures. Prerequisite, Course 5304. Mr. WINDING.

5505. *ADVANCED PROBLEMS IN HEAT TRANSFER.* Spring term. Credit three hours. Conferences and lectures. Prerequisites, Courses 5503 and 5504. Mr. SMITH.

5506. *ADVANCED PROBLEMS IN DIFFUSIONAL OPERATIONS.* Fall term. Credit three hours. Conferences and lectures. Prerequisites, Courses 5503 and 5504. Mr. WINDING.

5603. *CHEMICAL ENGINEERING EQUIPMENT DESIGN.* Fall term. Two hours credit. Lectures. Prerequisite, Course 5504. Mr. SMITH.

5604. *CHEMICAL ENGINEERING EQUIPMENT DESIGN.* Spring term. Two hours credit. Lectures. Prerequisite, Course 5504. Mr. SMITH.

5605. *CHEMICAL ENGINEERING PLANT DESIGN.* Fall term. Two hours credit. Messrs. RHODES, WINDING, SMITH, VON BERG, and WIEGANDT.

5606. *CHEMICAL ENGINEERING PLANT DESIGN.* Spring term. Two hours credit. Messrs. RHODES, WINDING, SMITH, VON BERG, and WIEGANDT.

5701. *PLANT INSPECTIONS.* Spring term. One hour credit.

5711. *LIBRARY USE AND PATENTS.* Spring term. One hour credit. Messrs. RHODES and MASON. Primarily for undergraduates.

5741. *PETROLEUM REFINING.* Fall term. Three hours credit. Lectures. Prerequisite, Course 5304. Mr. WIEGANDT.

5742. *SYNTHETIC RESINS AND PLASTICS.* Spring term. Three hours credit. Lectures. Prerequisite or parallel, Course 5304. Mr. WINDING.

5745. *CONTROL OF CHEMICAL ENGINEERING PROCESSES.* Fall term. Credit three hours. Lectures. Prerequisite or parallel, Course 5304. Mr. RHODES.

5746. *CHEMICAL ENGINEERING ECONOMICS.* Spring term. Credit three hours. Prerequisite, Course 5304. Mr. HEDRICK.

5851. *CHEMICAL MICROSCOPY.* Either term. Three hours credit. Lectures and laboratory. Prerequisite or parallel, Chemistry 404 and Physics 17 or 18 or special permission. Mr. MASON and assistants. Preregistration required.

5853. *MICROSCOPICAL QUALITATIVE ANALYSIS (INORGANIC).* Either term. Credit two or more hours. Laboratory practice. Prerequisite, Chemical Engineering 5851. Mr. MASON. Preregistration required.

5854. *MICROSCOPICAL METHODS IN ORGANIC CHEMISTRY.* Either term. Credit two or more hours. Laboratory practice. Prerequisites, Chemical Engineering 5851 and special permission. Mr. MASON. Peregistration required.

5859. *ADVANCED CHEMICAL MICROSCOPY.* Either term. Credit one or more hours. Laboratory practice. Prerequisite, Course 5851 and special permission. Mr. MASON and assistants. Preregistration required.

6120, 6121. *ADVANCED FOUNDRY ENGINEERING.* Fall and spring terms. Credit three hours a term. Lectures and recitations. Prerequisite, Engineering 6113 or 6114. Mr. KYLE.

6203, 6204. *SMELTING AND REFINING.* Fall and spring terms. Credit three hours a term. Lectures. Prerequisites, Chemistry 404 and Engineering 1256 and 6501. Mr. GREGG.

6221, 6222. *ADVANCED SMELTING AND REFINING.* Fall and spring terms. Credit three hours a term. Lectures and conferences. Prerequisites, Engineering 6203, 6204. Mr. GREGG.

6253. *UNIT PROCESSES IN METALLURGY.* Fall term. Credit three hours. Prerequisite or parallel, Slag-Metal-Atmosphere Reactions, Engineering 6203. Mr. GREGG. One lecture and one laboratory period each week, with reports.

6254. *UNIT PROCESSES IN METALLURGY.* Spring term. Credit two hours. Prerequisite, Unit Processes in Metallurgy, Engineering 6253. Mr. GREGG. One lecture and one laboratory period each week with reports.

6311. *PHYSICAL METALLURGY.* Fall term. Credit three hours. Prerequisite, Introductory Metallography, Engineering 6811. Mr. MASON. Lectures.

6351. *PHYSICAL METALLURGY LABORATORY.* Fall term. Credit three hours. Parallel course, Physical Metallurgy, Engineering 6311. Messrs. MASON and BURTON. Laboratory periods and conferences.

6602. *METALLURGICAL DESIGN.* Spring term. Credit three hours. Prerequisite, Physical Metallurgy, Engineering 6311, or special permission. Lectures.

6701. *PLANT INSPECTIONS.* Spring term. Credit one hour. Preregistration required.

DESCRIPTIVE GEOMETRY AND DRAWING

IN CIVIL ENGINEERING

Professor H. T. JENKINS

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Engineering*, School of Civil Engineering, Courses 2001 and 2002.

2004. *ADVANCED DRAWING.* Either term. Credit and hours to be arranged. Prerequisite courses, Engineering 2002, or its equivalent. Professor JENKINS.

2005. *CARTOGRAPHY.* Fall term. Credit three hours. Hours to be arranged. Professor JENKINS.

2006. *MAP REPRODUCTION.* Spring term. Credit three hours. Hours to be arranged. Professor JENKINS.

IN MECHANICAL ENGINEERING

Professor S. F. CLEARY; *Associate Professor* W. E. MORDOFF; *Assistant Professors* T. J. BAIRD and R. H. SIEGFRIED.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Engineering*, Courses 3111, 3112, 3116. Preregistration required.

ELECTRICAL ENGINEERING

Professors C. R. BURROWS, W. C. BALLARD, H. G. BOOKER, L. A. BURCKMYER, JR., R. F. CHAMBERLAIN, A. B. CREDLE, M. G. MALTI, M. S. MCILROY, T. MCLEAN, W. E. MESERVE, B. K. NORTHROP, H. G. SMITH, E. M. STRONG, J. G. TARBOUX, S. W. ZIMMERMAN; *Associate Professors* P. D. ANKRUM, W. W. COTNER, C. L. COTTRELL, W. H. ERICKSON, C. E. INGALLS, W. R. JONES, R. E. OSBORN, S. L. SCHAUSS; *Assistant Professors* N. H. BRYANT, A. E. DAVIES, M. J. KELLY, S. LINKE, J. C. LOGUE, H. S. MCGAUGHAN, B. NICHOLS.

The School of Electrical Engineering has the following laboratories suitable for graduate work: ADVANCED ELECTRICAL MACHINERY LABORATORY, ELECTRICAL MEASUREMENTS AND STANDARDIZATION LABORATORY, BASIC ELECTRONICS LABORATORY,

RADIO AND COMMUNICATIONS LABORATORY, INDUSTRIAL ELECTRONICS LABORATORY, ELECTRONICS APPARATUS AND PROJECT LABORATORY, SERVOMECHANISMS LABORATORY, HIGH-VACUUM AND TUBE-CONSTRUCTION LABORATORY, TELEVISION LABORATORY, AND HIGH-VOLTAGE LABORATORY.

Special equipment for experimental research is provided through a fully equipped and manned machine shop.

Undergraduate courses: For undergraduate courses which meet needs of certain graduate students, see the *Announcement of the College of Engineering*, School of Electrical Engineering, Courses 4112, 4121, 4122, 4126, 4131, 4211, 4216, 4221, 4226, and 4611.

Graduate courses and topics: In addition to the formal courses listed below, members of the Faculty are prepared to guide individual students in special topics. Seminars are conducted by members of the Faculty for groups of graduate students interested in closely related lines of study and research.

Adequate work in advanced physics and mathematics is required of candidates for the Ph.D. degree majoring in a field of electrical engineering, even though these sciences may not be specified as minor subjects.

ELECTRIC POWER SYSTEM ENGINEERING

4326. *POWER LABORATORY.* Fall term only. Credit three hours. Prerequisites, 4226 and 4311. Professor BURCKMYER. One lecture and one lecture-laboratory period each week.

4334. *ECONOMICS OF PUBLIC UTILITIES.* Spring term only. Credit two hours. Prerequisite, a course in economics. Professor MCILROY. Two recitations each week.

4361. *POWER SYSTEMS.* Spring term only. Credit three hours. Prerequisite, 4221. Professor TARBOUX. Two lectures and one computing period each week.

4362. *TRANSMISSION OF ELECTRIC ENERGY.* Fall term only. Credit three hours. Prerequisites, 4311 and 4361. Professor TARBOUX. Two lectures and one computing period each week.

4363. *STABILITY OF ELECTRIC POWER SYSTEMS.* Spring term only. Credit two hours. Must be preceded or accompanied by 4362. Professor TARBOUX. Two lectures each week.

4364. *PROTECTION AND RELAYING ON POWER CIRCUITS.* Fall term only. Credit three hours. Must be preceded or accompanied by 4371. Professor TARBOUX. Three lectures each week.

4365. *SYMMETRICAL COMPONENTS.* Fall term only. Credit three hours. Prerequisites, 4311, 4321, and 4361. Professor MCILROY. Three lectures each week.

4371. *HIGH VOLTAGE PHENOMENA.* Fall term only. Credit three hours. Prerequisite, 4362. Professor ZIMMERMAN. Two lectures and one period each week.

4372. *HIGH VOLTAGE PHENOMENA.* Spring term only. Credit 3 hours. Prerequisites, 4362 and 4371. Professor ZIMMERMAN. Two lectures and one period each week.

TOPICS SUGGESTED FOR ADVANCED WORK

Electric Power Generation
Electric Power-System Stability and Regulation
Electric Power Transmission and Distribution
Electrical Control and Relaying
High-Voltage Phenomena
Symmetrical Components
Economics of Public Utilities

ELECTRIC POWER UTILIZATION AND CONTROL

4321. *ELECTRICAL MACHINE THEORY.* Spring term only. Credit three hours. Prerequisite, 4221. Professor TARBOUX. Three recitations each week.

[4331. *ELECTRICAL DESIGN ECONOMICS.* Fall term only. Credit three hours. Prerequisites, 4211 and 4221. Professor MCILROY. Two recitations and one computing period each week. Not given in 1951–52.]

4341. *MOTOR CONTROL.* Fall term only. Credit two hours. Prerequisite, 4226. Professor MESERVE. One lecture and one recitation each week.

4342. *APPLICATION OF MOTORS.* Spring term only. Credit three hours. Prerequisite, 4341. Professor MESERVE. One lecture, one recitation, and one computing period each week.

[4343. *AIRCRAFT AND MARINE ELECTRIC POWER AND CONTROL SYSTEMS.* Credit two hours. Prerequisites, 4321 and 4341. Professor MESERVE. Two recitations each week. Not offered in 1951–52.]

4411. *ELECTRONIC CONTROL EQUIPMENT.* Spring term only. Credit three hours. Prerequisites, 4121 and 4126. Professor NORTHROP. Two lectures and one laboratory period each week.

4415. *ADVANCED ELECTRONIC CONTROLS.* Spring term only. Credit three hours. Prerequisite, 4411. Professor NORTHROP. Two recitations and one computing period each week.

4421. *ELECTRONIC POWER CONVERTERS.* Fall term only. Credit three hours. Prerequisite, 4411. Professor NORTHROP. Two lectures and one lecture-laboratory period each week.

4451. *HIGH FREQUENCY HEATING.* Fall term only. Credit three hours. Prerequisite, 4421. Professor NORTHROP. Two lectures and one laboratory period each week.

4612. *ILLUMINATING ENGINEERING.* Spring term only. Credit three hours. Prerequisite, 4611. Professor STRONG. Two recitations and one lecture-laboratory period each week.

4615. *ILLUMINATION SEMINAR.* Fall term only. Credit two hours. Prerequisite, 4611. Professor STRONG. One two-hour period each week.

4711. *SERVOMECHANISMS: AUTOMATIC CONTROL SYSTEMS.* Spring term only. Credit three hours. Prerequisites, 4121, 4126, 4216, and 4221. Professor MESERVE. Two lecture-recitations and one laboratory or computing period each week.

4712. *ADVANCED SERVOMECHANISMS.* Fall term only. Credit three hours. Prerequisite, 4711. Professor MESERVE. Two lecture-recitations and one laboratory or computing period each week.

Special attention is called to the following courses listed under other fields: Physics 215, Psychology 211, Speeech and Drama 437.

TOPICS SUGGESTED FOR ADVANCED WORK

Electronic Controls
Electronic Metering
Electronic Power Converters
High-Frequency Heating
Low-Frequency Heating
Motor Applications and Control
Illuminating Engineering
Illumination and Color
Illumination Distribution in Interiors
Illumination and Vision
Illumination Measurements
Special Lighting Problems
Servomechanisms

COMMUNICATION ENGINEERING

4511. *RADIO AND COMMUNICATION THEORY.* Spring term only. Credit three hours. Prerequisite, 4122. Professor CREDLE. Two lectures and one recitation or computing period each week.

4512. *RADIO AND COMMUNICATION THEORY.* Fall term only. Credit three hours. Professor SMITH. Two lectures and one recitation or computing period each week.

4516. *RADIO AND COMMUNICATION LABORATORY.* Spring term only. Credit three hours. Must be preceded or accompanied by 4511. Associate Professor INGALLS. One recitation and one laboratory period each week. Experiments paralleling the work of Course 4511.

4517. *RADIO AND COMMUNICATION LABORATORY.* Fall term only. Credit three hours. Must be preceded or accompanied by 4512. Professor CREDLE. One recitation and one laboratory period each week. Experiments paralleling the work of Course 4512.

4521. *RADIO BROADCASTING.* Credit three hours. Prerequisite, 4511. Must be preceded or accompanied by 4512. Professor SMITH. Two lectures and one lecture-laboratory or computing period each week.

4522. *TELEPHONE AND TELEGRAPH SYSTEMS.* Credit two hours. Prerequisite, 4131. Professor BALLARD. Two recitations each week.

4526. *DESIGN AND CONSTRUCTION OF VACUUM TUBES.* Fall term only. Credit three hours. Prerequisite, 4511. Associate Professor JONES. Two lecture-recitations and one laboratory period each week.

4527. *DESIGN AND CONSTRUCTION OF VACUUM TUBES.* Spring term only. Credit 3 hours. Prerequisite, 4526. Associate Professor JONES. Two lecture-recitations and one laboratory period each week.

4531. *TELEVISION SYSTEMS.* Credit three hours. Prerequisites, 4511 and 4513. Associate Professor INGALLS. Two lectures and one laboratory period each week.

4541. *APPLIED ACOUSTICS AND AUDIO ENGINEERING.* Credit two hours. Prerequisites, 4122 and 4131. Professor MCLEAN. Two recitations each week.

4551. *RADIO AIDS TO NAVIGATION.* Credit two hours. Prerequisite, 4131. Professor MCLEAN. Two recitations each week.

4561. *ULTRA-HIGH-FREQUENCY SYSTEMS.* Credit two hours. Must be preceded or accompanied by 4565. Professor BALLARD. One recitation and one laboratory period each week.

4563. *PULSE TECHNIQUE IN COMMUNICATION AND RADAR.* Fall term only. Credit three hours. Prerequisites, 4511 and 4516. Assistant Professor MCGAUGHAN. Three recitations each week.

4564. *TRANSMISSION OF INFORMATION.* Spring term only. Credit three hours. Prerequisites, 4511 and 4516. Assistant Professor MCGAUGHAN. Three recitations each week.

4565. *ELECTROMAGNETIC THEORY.* Fall term only. Credit three hours. Prerequisite, 4512. Professor BOOKER. Three lecture-recitations each week.

4566. *RADIO WAVES.* Spring term only. Credit three hours. Prerequisite, 4565. Professor BOOKER. Three lecture-recitations each week.

4567. *RADIO WAVES.* Fall term only. Credit three hours. Prerequisite, 4566. Professor BOOKER. Three lecture-recitations each week.

4568. *ANTENNAS.* Spring term only. Credit three hours. Prerequisite, 4565. Professor BOOKER. Three lecture-recitations each week.

4571. *THEORY OF FOUR-TERMINAL NETWORKS.* Credit three hours. Prerequisite, 4513. Assistant Professor MCGAUGHAN. Three lecture-recitations each week.

TOPICS SUGGESTED FOR ADVANCED WORK

Acoustical Engineering
Analysis of Communication Networks
Carrier Systems
Communication-System Engineering
Design and Construction of Vacuum Tubes
Economics of Communication Services
Microwave Theory and Techniques
Radio Aids to Navigation
Radio Engineering
Radio Transmitters and Receivers
Radio-Wave Propagation
Television Systems
Wire Transmission

GENERAL

4113. *TRANSMISSION LINES AND FILTERS.* Either term. Credit three hours. Must be preceded or accompanied by 4122. Professor MCLEAN. Three recitations each week.

4114. *TRANSIENTS IN LINEAR SYSTEMS.* Either term. Credit three hours. Professor MALTI. Two recitations and one computing period each week.

4115. *TRANSIENT ANALYSIS.* Spring term. Credit three hours. Prerequisite, 4114. Professor MALTI. Two recitations and one computing period each week.

4386. *ELECTRICAL MEASUREMENTS.* Available upon sufficient demand. Credit two hours or more. Prerequisites, 4311 and 4326. Professor BURCKMYER. The course emphasizes the development of electrical apparatus and methods for specialized measuring purposes. Topics of investigation will be selected in accordance with the major interests of those enrolled.

TOPICS SUGGESTED FOR ADVANCED WORK

Alternating-Current Circuit Analysis
Electrical-Machine Theory and Operation
Properties of Solid Dielectrics
Research in Magnetic Materials
Electrical Measuring and Testing

ENGINEERING PHYSICS

Professors LLOYD P. SMITH, H. G. BOOKER, C. R. BURROWS, A. B. CREDLE, T. R. CUYKENDALL, G. E. GRANTHAM, D. F. GUNDER, M. KAC, A. R. KANTROWITZ, H. S. SACK, W. R. SEARS; *Associate Professors* D. R. CORSON, P. L. HARTMAN, B. M. SIEGEL.

The aim of graduate work in engineering physics is to undertake concentrated work on an advanced level in a field of specialization which may cross conventional subject matter boundaries as well as deepen and enlarge the general scientific and engineering background of the student. For this reason, the minor subject or subjects should be chosen in approved fields outside engineering physics.

The thesis can be done in any field represented by the members of the engi-

neering physics Faculty, or, if the student's special committee approves, in other fields in which the engineering physics aspects may be significant. The course work in engineering physics will be chosen from the graduate courses offered in the various schools of the College of Engineering or in the Departments of Physics, Chemistry, or Mathematics of the College of Arts and Sciences. The members of the student's committee in charge of engineering physics will advise the student in the choice of these courses.

8512. *ELECTRON MICROSCOPY.* Spring term. Credit three hours. Prerequisite, consent of the instructor. Lecture and laboratory hours to be arranged. Associate Professor SIEGEL.

8517. *ELECTRON OPTICS AND THE ELECTRON MICROSCOPE.* Fall term. Credit three hours. Prerequisite, Physics 225 (Physics 215 advised but not required). M W F 11. Associate Professor SIEGEL.

8090. *INFORMAL STUDY IN ENGINEERING PHYSICS.* Either term. Laboratory or theoretical work in any branch of engineering physics under the direction of a member of the Staff. Hours to be arranged.

HEAT-POWER ENGINEERING

Professors C. O. MACKEY, F. S. ERDMAN, P. F. MARTINUZZI; *Associate Professors* W. C. ANDRAE, R. E. CLARK, D. DROPKIN, H. N. FAIRCHILD, N. R. GAY, I. KATZ, L. L. OTTO, E. B. WATSON; *Assistant Professors* C. R. OTTO, D. G. SHEPHERD, E. R. WAIT.

As prerequisite for graduate study in this field, the student should have had the equivalent of the fundamental courses in heat-power engineering that are required of undergraduates in mechanical engineering at Cornell. These courses are described in the *Announcement of the College of Engineering.* Those lacking the full equivalent of this training may be required to take one or more of these undergraduate courses or to do assigned work to make up the deficiency.

Opportunities for analytical work include original investigations in engineering thermodynamics; interpretive studies of available data; investigations in power plant economics; design, selection, and arrangement of apparatus to meet specific requirements.

The laboratories and shops of the Sibley School of Mechanical Engineering are available for carrying on experimental and laboratory work in this field. In these laboratories there is equipment for the advanced study of internal combustion engines, gas turbines, steam engines, steam turbines, pumps, compressors, fans, steam generating units, heat transfer, refrigeration, air conditioning, and engineering instruments.

Students who contemplate doing laboratory work in this field should communicate with the Department in advance of beginning work in order to arrange for the use of equipment.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* Department of Heat-Power Engineering, Courses 3501, 3502, 3503, 3504, 3505, 3506, 3507.

3550. *HEAT-POWER RESEARCH.* Either term. Credit depends upon actual work as arranged with Department. Preregistration required.

3551. *STEAM TURBINES.* Fall term. Credit two hours. Prerequisite, 3501. Associate Professor CLARK. Preregistration required.

3553. *TEMPERATURE MEASURING INSTRUMENTS.* Spring term. Credit two hours. Associate Professor DROPKIN. Preregistration required.

3554. *DIMENSIONAL ANALYSIS.* Spring term. Credit one hour. Associate Professor ANDRAE. Preregistration required.

3555. *GRAPHICAL COMPUTATION AND REPRESENTATION.* Fall term. Credit two hours. Professor MACKEY. Preregistration required.

3556. *ADVANCED AIR CONDITIONING.* Spring term. Credit three hours Prerequisite, 3505. Professor MACKEY. Preregistration required.

3560. *AIRCRAFT POWER PLANTS.* Either term. Credit three hours. Prerequisite, 3507. Associate Professor KATZ. Preregistration required.

3561. *AIRCRAFT ENGINE DESIGN.* Either term. Credit three hours. Prerequisites, 3660, 3507, 3353. Associate Professor KATZ. Preregistration required.

3563. *ADVANCED THERMODYNAMICS.* Spring term. Credit three hours. Prerequisite, 3501. Associate Professor GAY. Preregistration required.

3570. *AUTOMATIC CONTROL ENGINEERING.* Either term. Credit three hours. Prerequisite or parallel, 3502 and 2331. Assistant Professor C. R. OTTO. Preregistration required.

3580. *DIESEL ENGINES.* Each term. Credit three hours. Prerequisites, 3501, 3507. Associate Professor WATSON. Preregistration required.

3590. *GAS-TURBINE PLANTS.* Either term. Credit three hours. Prerequisite, 3501. Professor MARTINUZZI. Preregistration required.

3591. *PRINCIPLES OF TURBO-MACHINERY.* Either term. Credit three hours. Prerequisites, 2331, 3501. Assistant Professor SHEPHERD. Preregistration required.

TOPICS SUGGESTED FOR ADVANCED WORK

Advanced Engineering Thermodynamics
Aircraft Power Plants
Air Conditioning
Combustion Engines
Compressors and Pumps
Flow of Fluids
Fuels, Combustion, Burners, Furnaces
Heat Transfer
Instruments and Controls
Refrigeration
Steam Engineering

HYDRAULICS AND HYDRAULIC ENGINEERING

IN CIVIL ENGINEERING

Associate Professors MARVIN BOGEMA, LINCOLN REID, M. S. PRIEST; *Assistant Professor* G. B. LYON.

Major work in experimental hydraulics, theoretical hydraulics, or hydraulic engineering may consist in part (subject to the thesis requirements) of advanced courses, or the entire minor work may consist of such courses accompanied by special work and reports as may be arranged with the members of the special committee.

A candidate for the degree of Master of Civil Engineering (or of Science), or Doctor of Philosophy, who desires to take either a major or minor subject in these fields of study must ordinarily have completed, preliminary to graduate work, courses in hydraulics (including laboratory), municipal sanitation (including sewer design and construction and sewage disposal), and water supply, substantially equivalent to these courses as required of all undergraduates in the School of Civil Engineering. If a graduate student lacks one or more of these

preliminary courses or considerable portions of any of them, more than the minimum period of residence may be necessary.

For major work in experimental (or theoretical) hydraulics the thesis requirements may be satisfied by individual experimental (or theoretical) investigation and a thesis based thereon. The tendency is to underestimate the time required for preliminary thesis work and that necessary for a thorough digestion of results. Consequently, the work should be begun, if possible, during the first term of residence.

2303. *ADVANCED HYDRAULICS.* Fall term. Credit three hours. Prerequisites, 2302 (or 2331). Mr. BOGEMA. Three recitations a week as arranged. Preregistration required.

2304. *HYDRAULIC MEASUREMENTS.* Fall term. Credit three hours. Prerequisites, 2302 (or 2331). Mr. REID. One lecture and two laboratory periods a week as arranged. Preregistration required.

2305. *HYDRODYNAMICS.* Spring term. Credit three hours. Prerequisites, 2302 (or 2331) and differential equations. Mr. PRIEST. Three recitations a week as arranged. Preregistration required.

2306. *PUMPS AND TURBINES.* Spring term. Credit three hours. Prerequisites, 2302 (or 2331). Mr. BOGEMA. Two recitations and one laboratory or computation period a week. Preregistration required.

2307. *FLOW OF LIQUIDS IN OPEN CHANNELS.* Fall term. Credit three hours. Prerequisites, 2302 (or 2331). Mr. PRIEST. Two lectures and one computation period a week. Preregistration required.

2308. *HYDRAULIC MODELS.* Spring term. Credit three hours. Prerequisites, 2302 (or 2331). Mr. REID. One lecture and two laboratory or computation periods a week. Preregistration required.

2342. *HYDRAULIC RESEARCH.* Either term. Credit as arranged. Prerequisites, 2302 (or 2331). Messrs. BOGEMA, LYON, PRIEST, and REID.

2343. *HYDRAULIC SEMINAR.* Either term. Credit one hour. Messrs. BOGEMA, LYON, PRIEST, and REID.

HYDRAULIC ENGINEERING

For undergraduate courses which often meet the needs of graduate students, see *Announcement of the College of Engineering,* Department of Hydraulics, Courses 2401 and 2402. Preregistration is required for both courses.

2403. *HYDRAULIC STRUCTURES.* Spring term. Credit three hours. Prerequisite, 2402. Mr. LYON. Preregistration required.

2404. *WATER POWER.* Fall term. Credit three hours. Prerequisite, 2402. Mr. REID. Two lectures and one computation period each week. Preregistration required.

2406. *FLOOD CONTROL.* Fall term. Credit three hours. Prerequisite, 2402. Mr. LYON. Two lectures and one computation period each week. Preregistration required.

2410. *EROSION AND SEDIMENTATION.* Spring term. Credit three hours. Prerequisites, 2401 and Engineering Geology 113. Mr. CHRISTENSEN. Preregistration required.

2411. *RIVERS AND HARBORS.* Fall term. Credit three hours. Prerequisites, 2302 and 2401. Mr. PRIEST. Preregistration required.

2442. *HYDRAULIC ENGINEERING RESEARCH.* Either term. Credit as arranged. Prerequisites, 2402 and additional courses in selected field. Staff.

2443. *HYDRAULIC ENGINEERING SEMINAR.* Spring term. Credit one hour. Staff.

INDUSTRIAL AND ENGINEERING ADMINISTRATION

Professors H. J. LOBERG, C. I. MILLARD, A. SCHULTZ, JR.; *Associate Professor* K. C. WHITE; *Assistant Professors* M. W. SAMPSON, B. W. SAUNDERS.

Graduate training in this department has two objectives: (1) to develop exceptional abilities in specific fields of industrial and engineering administration, (2) to develop balanced training in the factors that are related to this specialization. The emphasis is on the development of initiative and self-reliance that go with individual study and the practical application of methods to working solutions. Aspects of economy and potential dollar return are stressed whenever feasible. Much of the work requires the integration of a knowledge of processes and process tools, product design, materials, methods, design of tools, jigs and fixtures, inspection, cost data, and market needs. Other projects might be wholly concerned with the development of systems or techniques by the application of basic principles of any of the above fields.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* Department of Industrial and Engineering Administration, Courses 3232, 3254, 3262, 3263, 3270.

3242. *STATISTICAL QUALITY CONTROL.* Spring term. Credit three hours. Prerequisite, 3241 or equivalent. Associate Professor SCHULTZ. Preregistration required.

3265. *PRODUCTION CONTROL.* Spring term. Credit three hours. Prerequisite, 3264. Professor MILLARD. Two recitations and one laboratory period a week. Preregistration required.

3266. *ADVANCED METHODS ENGINEERING.* Credit three hours. Prerequisite, 3262. Associate Professor WHITE. One recitation and two laboratory periods a week. Preregistration required.

3271. *INDUSTRIAL MARKETING RESEARCH.* Fall term. Credit three hours. Prerequisite, 3270. Professor LOBERG. Preregistration required.

3272. *INDUSTRIAL SALESMANSHIP.* Credit two hours. Prerequisite, 3270. Professor LOBERG. One recitation and one computing period a week. Preregistration required.

3290. *SPECIAL INVESTIGATIONS IN INDUSTRIAL AND ENGINEERING ADMINISTRATION.* Credit as arranged. Offered to qualified students individually or in small groups. Preregistration required.

TOPICS SUGGESTED FOR ADVANCED WORK

Motion and Micro-Motion Analysis
Practical Economic and Production Investigation in Near-by Industries
Economic Control of Quality in Production
Industrial Marketing Studies
Statistical Aspects of Quality Control
Industrial Applications of Statistics
Cost Control through Unit Costs
Plant Layout and Materials-Handling Problems
Engineering Economy Studies
Time Study Standards
Elemental Time Standards
Problems in Production and Management Control
Personnel Studies

MACHINE DESIGN

Professor A. H. BURR; *Associate Professor* G. B. DUBOIS; *Assistant Professors* S. G. HOLT, JR., H. H. MABIE, R. M. PHELAN, F. SALTZ, W. A. WHEELER, JR.

Opportunity is provided for graduate work in the application of theory and the results of experimental investigations to the design of machines and machine members, and provision is made for original work, under guidance, in the design and development of complete machines and in the analysis and experimental investigation of machines and their components.

The College of Engineering Library and the Department have an excellent collection of books and periodicals related to machine design and analysis. There is a unique collection of mechanism models and machinery components. Photoelastic equipment, vibration and strain indicating instruments, balancing machines, and machines for performance tests on bearings and friction materials are available for experimental investigations.

For a description of the following courses and for undergraduate courses that may meet the needs of graduate students see the *Announcement of the College of Engineering,* Department of Machine Design.

3361. *ADVANCED MACHINE ANALYSIS.* Fall term. Credit three hours. Prerequisite, 3353 or equivalent. Professor BURR. Three lecture-discussion periods a week. Preregistration required.

3366. *ADVANCED KINEMATICS.* Spring term. Credit three hours. Prerequisite, 3352 or equivalent. Professor MABIE. Two lecture-discussion periods and one design period a week. Preregistration required.

3367. *DESIGN PROBLEMS IN VIBRATIONS AND DYNAMICS.* Spring term. Credit three hours. Prerequisites, 1155, 3352, and 3353 or equivalent. Professor HOLT. Two lectures and one experimental laboratory or computing period a week. Preregistration required.

3370. *SPECIAL INVESTIGATIONS IN MACHINE DESIGN.* Each term. Credit arranged.

3372. *MACHINE DESIGN LABORATORY.* Fall term. Credit three hours. Prerequisite, 3353 or equivalent. Professor HOLT. One lecture and two laboratory periods a week. Preregistration required.

3373. *CREATIVE DESIGN.* Fall term. Credit two hours. Prerequisite, 3354 or 3356 or equivalent. Professor DUBOIS. Two design periods a week. Preregistration required.

3375. *MACHINERY SURVEY.* Spring term. Credit three hours. Prerequisite, 3353 or equivalent. Professor BURR. Two lectures and one laboratory period for field trips each week. Preregistration required.

TOPICS SUGGESTED FOR ADVANCED WORK

Design and Development of a Special Machine
Bearings and Lubrication
Special Gear Teeth, Cams, or Linkages
Vibration, Noise, or Impact in a Machine
Photoelastic or Other Experimental Stress Analysis of a Machine Component
Balancing of Rotation Components
Jigs and Fixture Design

MATERIALS PROCESSING

Associate Professors ERIK K. HENRIKSEN, ROGER L. GEER.

A general survey on an advanced background is given of the principal features of cutting tools, work and tool-holding devices, and the machine tools, illustrated by the assignment of projects to be worked out in the laboratory, which also provides facilities for individual work on the measuring of performance and efficiency of tools and machines, testing and inspecting of equipment, experimental investigation of new methods, introduction of improvements, and participation in research projects.

3411. *CUTTING TOOLS.* Either term. Credit three hours. Prerequisite, 3403 or equivalent; desirable, 6110 or 1221 or equivalent. Associate Professors GEER and HENRIKSEN. Two lecture periods and one laboratory period a week.

3413. *MACHINE TOOLS.* Either term. Credit three hours. Prerequisite, 3351 or equivalent. Associate Professors GEER and HENRIKSEN. Two lecture periods and one laboratory period a week.

3425. *ADVANCED GAGE LABORATORY.* Either term. Credit three hours. Prerequisites, 3405, 1232; and the student must either have had 3242 or be registered in it. Associate Professor GEER and Mr. DISPENZA. One lecture and two laboratory periods per week.

TOPICS SUGGESTED FOR ADVANCED WORK

Equipment, Methods and Tooling for Maximum Production
High Precision Equipment and Methods
Gear and Thread Manufacturing Methods
Force Measurement on Tools
Tool Wear and Tool Life
Cutting Fluids
Precision and Rigidity Problems in Machine Tools
Relative Performance of Mechanical, Hydraulic, and Electric Drives in Machine Tools
Modernization of Machine Tools
Surface Finish and Wear
The Effect of Surface Quality and Hardness on Wear of Gages
The Effect of Measuring Pressure on Contact Measurement
The Effect of Temperature on Precision Measurements
Classification and Applications of Automatic Gaging Methods
Gaging Laboratories
Fundamental Studies of Air Jet Phenomena as Applied to Measurements

MANAGEMENT ENGINEERING

IN CIVIL ENGINEERING

Professor R. Y. THATCHER; *Associate Professors* CARL CRANDALL, J. E. PERRY; *Assistant Professor* J. C. GEBHARD.

The graduate student who is not familiar with methods of construction may well take Course 2901. Graduate students who have not had a course in engineering economics will take Course 2903.

2901. *CONSTRUCTION METHODS.* Either term. Credit three hours. Messrs. CRANDALL and PERRY.

2902. *ENGINEERING LAW.* Either term. Credit three hours. Messrs. THATCHER, CRANDALL, PERRY, GEBHARD.

2903. *ECONOMICS OF ENGINEERING.* Either term. Credit three hours. Messrs. THATCHER and GEBHARD.

2904. *PUBLIC ADMINISTRATION.* Either term. Credit three hours. Lectures and recitations three hours a week. Mr. CRANDALL.

2905. *VALUATION ENGINEERING.* Credit three hours. Prerequisites, 2901 and 2902. May be taken concurrently with Course 2902. Mr. CRANDALL. Lectures, recitations, and reports.

2906. *ADVANCED ENGINEERING LAW.* Credit three hours. Prerequisite, 2902. Mr. THATCHER. Lectures and recitations three hours a week.

2907. *CONSTRUCTION MANAGEMENT.* Credit three hours. Prerequisites, 2901 and 2903. Mr. CRANDALL. Lectures and recitations three hours a week.

2942. *RESEARCH IN MANAGEMENT ENGINEERING.* Any term. Credit three hours or more. Messrs. THATCHER, CRANDALL, PERRY.

MATERIALS OF ENGINEERING

Professors D. F. GUNDER, J. O. JEFFREY, J. R. MOYNIHAN, H. S. SACK; *Associate Professor* F. O. SLATE; *Assistant Professor* D. A. STUART.

The Department of Engineering Materials offers work in both theoretical and experimental procedures for evaluating the properties of engineering materials. All graduate students are urged to acquire fundamental training in both of these phases. In addition to the courses listed below many other courses listed under mechanics, metallurgy, and physics should be considered as appropriate and necessary supplements in an adequate training in the field of materials engineering. Laboratory facilities are available for investigations in metals, concrete, cement, concrete aggregate, timber, plastics, fuels, lubricants, and miscellaneous materials.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* Department of Materials of Engineering, 1201, 1202, 1211, 1212, 1221, 1222, 1231, 1232, 1255, 1256.

1215. *MATERIALS SEMINAR.* Elective. One one-hour period for each credit hour.

1216. *STRUCTURE AND PROPERTIES OF MATTER.* Fall term. Credit two hours. For graduate students in any branch of engineering. Prerequisite, permission of the instructor. Associate Professor SLATE.

1251. *ENGINEERING MATERIALS RESEARCH.* Each term. Prerequisites, 1231, 1232, or 1212. Professors MOYNIHAN, JEFFREY, and SLATE. Credit one hour for forty hours of actual work.

1252. *APPLIED PHYSICAL METALLURGY.* Alternate terms. Prerequisite, 1231. Professors JEFFREY or MOYNIHAN.

1253. *PHYSICS OF ENGINEERING MATERIALS.* Any term. Open to graduate students by permission. Associate Professor SACK, Engineering Physics.

1261. *PLASTIC BEHAVIOR OF SOLIDS.* Fall term. Associate Professor SACK.

TOPICS SUGGESTED FOR ADVANCED WORK

Applied Physical Metallurgy
Control of Properties of Engineering Materials
Properties of Engineering Materials, Metallic or Nonmetallic
Physics of Engineering Materials
Fuels
Insulating Materials
Lubrication
Radiographic Examination of Metals and Alloys
Properties of Plastics
Properties of Lubricants
Thermal Qualities of Quenching Liquids
Low-Temperature Behavior of Engineering Materials
Heat Treatment and Isothermal Quenching

MECHANICS

Professors H. D. CONWAY, T. R. CUYKENDALL, D. F. GUNDER; *Associate Professors* E. V. HOWELL, H. C. PERKINS.

The Department of Mechanics endeavors to serve a twofold purpose in the field of graduate study. It offers training for men who intend to make teaching and academic research their field and for men who intend to devote their attention to industrial research. It is believed that both these groups are best served by a broad fundamental training, and, although the work in this Department is devoted primarily to the mechanics of particles and rigid bodies and of deformable solids, all students are encouraged to take work also in the fields of the mechanics of liquids and gases and in the related fields of materials, physics, and mathematics. Opportunity is provided for graduate students interested in teaching to participate in the teaching program in the University. Opportunity is likewise provided for those primarily interested in industrial research to participate in projects in this field. Candidates planning to complete a Master's degree in one year must have had Mechanics 1154 and 1155 or the equivalent upon entering. All courses are open to graduates or qualified undergraduates unless otherwise indicated.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* Department of Mechanics, Courses 1134, 1145, 1151, 1152, 1153, 1154, 1156, for all of which preregistration is required.

1162. *MECHANICS OF VIBRATIONS.* Fall term. Prerequisite, 1155 or equivalent. Elective for graduates and qualified undergraduates. Professor CONWAY.

1163. *APPLIED ELASTICITY.* Spring term. Prerequisite, 1155 or a knowledge of elementary differential equations, and permission of the instructor. Professor CONWAY. Hours arranged.

1164. *APPLIED ELASTICITY.* Fall term. Prerequisites, 1170 or a knowledge of elementary Fourier's series and permission of the instructor. Professor CONWAY. M W F 2. Continuation of 1163.

1165. *THEORY OF ELASTIC STABILITY.* Spring term. Prerequisites, 1154, 1155, or equivalents. Professor CONWAY.

1167. *THEORY OF PLATES AND SHELLS.* Spring term. Prerequisites, 1155 or knowledge of elementary differential equations and permission of instructor. Professor CONWAY.

1168. *ANALOGIES IN THE SOLUTION OF BOUNDARY VALUE PROB-*

LEMS OF ENGINEERING. Spring term. Prerequisite, permission of the instructor. Associate Professor CUYKENDALL.

1170. *ADVANCED MECHANICS.* Spring term. Prerequisite, 1155 and permission of the instructor. Professor GUNDER.

1171. *ADVANCED MECHANICS.* Fall term. Professor GUNDER. Continuation of 1170.

1172. *SELECTED TOPICS IN ADVANCED MECHANICS.* Offered as required. Special studies in selected topics.

1175. *INTRODUCTION TO NONLINEAR MECHANICS.* Spring term. Credit three hours. Prerequisite, a knowledge of elementary ordinary differential equations. Professor GUNDER.

1181. *ANALYSIS OF CURRENT LITERATURE IN APPLIED MECHANICS.* Fall term. Open to graduate students only. Registration by permission of instructor only. Professor GUNDER.

1182. *ELEMENTARY MECHANICS OF MATERIALS FROM AN ADVANCED STANDPOINT.* Summer term and otherwise when there is sufficient demand. Prerequisites, elementary differential equations and strength of materials. Professor CONWAY.

TOPICS SUGGESTED FOR ADVANCED WORK

Theory of Elasticity
Elastic Stability
Vibration
Fluid Motion
Photoelastic Stress Analysis

SANITARY ENGINEERING

Professor H. M. GIFFT; *Associate Professor* C. D. GATES; *Assistant Professor* W. O. LYNCH.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Engineering,* School of Civil Engineering, Courses 2501, 2502, 2503.

2504. *SANITARY BIOLOGY.* Either term. Mr. GATES. Three credit hours, one lecture, and two laboratory periods.

2506. *ADVANCED WATER SUPPLY.* Spring term. Three credit hours. Prerequisite, 2502. Messrs. GIFFT and GATES. Two recitations and one computing or laboratory period.

2507. *ADVANCED SEWERAGE WORKS.* Fall term. Three credit hours. Prerequisite, 2503. Messrs. GIFFT and GATES. Two recitations and one computing or laboratory period.

2508. *INDUSTRIAL WASTES.* Either term. Three credit hours. Prerequisite, 2503. Mr. GATES. Three lecture-recitation periods.

2509. *PUBLIC HEALTH.* Spring term. Three credit hours. Mr. GIFFT. Three lecture-recitation periods.

2511. *SANITARY ENGINEERING LABORATORY.* Either term. Three credit hours. Mr. GATES, Mr. LYNCH. One lecture and two laboratory periods.

2531. *STREAM POLLUTION.* Fall term. Three credit hours. Mr. GATES. Three lecture-recitation periods.

2541. *SANITARY ENGINEERING PROJECT.* Either term. Three or more credit hours, as arranged. Prerequisites, 2502 or 2503. Messrs. GIFFT, GATES, LYNCH.

2542. *SANITARY ENGINEERING RESEARCH.* Either term. Three or more credit hours, as arranged. Messrs. GIFFT, GATES, and LYNCH.

2543. *SANITARY ENGINEERING SEMINAR.* Either term. One or more credit hours, as arranged. Messrs. GIFFT, LYNCH, and GATES.

STRUCTURAL ENGINEERING AND SOIL ENGINEERING

Professors GEORGE WINTER, B. K. HOUGH; *Associate Professors* E. N. BURROWS, P. P. BIJLAARD; *Assistant Professors* G. P. FISHER, W. MCGUIRE.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* School of Civil Engineering, Courses 2704, 2720, 2725, for which preregistration is required.

2706. *STEEL BUILDINGS.* Either term. Three credit hours. Prerequisite, a steel design course. Mr. BURROWS.

2707. *STEEL BRIDGES.* Either term. Three credit hours. Prerequisite, a steel design course. Mr. BURROWS.

2708. *INVESTIGATION AND RATING OF EXISTING STEEL STRUCTURES.* Either term. Three credit hours. Prerequisite, a steel design course. Mr. BURROWS.

2709. *ADVANCED STRUCTURAL ANALYSIS.* Spring term. Three credit hours. Prerequisite, 2704. Mr. FISHER.

2710. *STRENGTH OF STRUCTURES.* Fall term. Three credit hours. Prerequisite or parallel, 2704. Mr. WINTER.

2711. *BUCKLING OF STRUCTURES.* Spring term. Three credit hours. Prerequisites, 2715, 2704, and differential equations. Mr. WINTER.

2712. *TANKS, BINS, AND ROOFS.* Spring term. Credit three hours. Prerequisites, 2704 and differential equations. Mr. WINTER.

2716. *ADVANCED REINFORCED CONCRETE DESIGN.* Either term. Credit three hours. Mr. FISHER.

2717. *REINFORCED CONCRETE BRIDGES.* Either term. Three credit hours. Prerequisite, 2704. Mr. FISHER.

2723. *LONG SPAN BRIDGES.* By arrangement. Three credit hours. Prerequisite, 2709, differential equations. Mr. MCGUIRE.

2741. *STRUCTURAL ENGINEERING DESIGN.* Either term, by arrangement. Messrs. WINTER, BURROWS, FISHER, and MCGUIRE.

2742. *STRUCTURAL ENGINEERING RESEARCH.* Either term, by arrangement. Messrs. WINTER, FISHER, and MCGUIRE.

2743. *STRUCTURAL ENGINEERING SEMINAR.* Either term, by arrangement. One to six hours credit. Staff.

SOIL ENGINEERING

2726. *SOILS ENGINEERING THEORY.* First term. Three credit hours. Prerequisite, 2725. Mr. HOUGH.

2727. *APPLIED SOILS ENGINEERING.* Second term. Three credit hours. Prerequisite, 2726. Mr. HOUGH.

TRANSPORTATION ENGINEERING

Professor D. J. BELCHER; *Associate Professors* J. E. PERRY, T. D. LEWIS; *Assistant Professor* R. J. HODGE.

The laboratories for the examination of nonbituminous and bituminous materials and their utilization, soils, subgrade stabilization problems, etc., are in the School of Civil Engineering. The other laboratories of the School of Civil Engineering, equipped for examining the properties of engineering materials, and the Ceramic Laboratory of the Department of Geology, are also available for graduate work in transportation engineering.

In addition to the scheduled courses for the graduate student, there is much graduate work of an independent character which requires investigation by the student and frequent conferences with staff members. Occasional field trips are also made.

Advanced work in engineering interpretation of aerial photographs and traffic engineering falls into the research category.

2602. *TRANSPORTATION.* Either term. Credit three hours. Messrs. LEWIS and PERRY.

2603. *RAILROAD MAINTENANCE OF WAY.* Term arranged. Credit three hours. Prerequisite, 2110. Mr. PERRY.

2604. *RAILROAD OPERATION AND MANAGEMENT.* Term arranged. Credit three hours. Prerequisite, 2110. Mr. PERRY.

2612. *HIGHWAY LABORATORY—BITUMINOUS.* Spring term. Credit three hours. Prerequisite, 2610. Mr. LEWIS.

2613. *HIGHWAY LABORATORY—STABILIZATION.* Fall term. Credit three hours. Prerequisite, 2610. Mr. LEWIS.

2614. *ADVANCED HIGHWAY ENGINEERING.* Spring term. Credit three hours. Prerequisite, 2610. Messrs. BELCHER and LEWIS.

2617. *AIRPORTS.* Fall term. Credit three hours. Prerequisite, 2610. Mr. HODGE.

2618. *LOW COST ROADS.* Either term. Credit three hours. Prerequisite, 2610 or its equivalent. Mr. BELCHER.

2620. *TRAFFIC ENGINEERING.* Either term. Credit three hours. Mr. LEWIS.

2621. *ENGINEERING INTERPRETATION OF AERIAL PHOTOGRAPHS.* Either term. Credit three hours. Prerequisites, 2610, 2725. Messrs. BELCHER and HODGE.

2641. *TRANSPORTATION ENGINEERING DESIGN.* Any term. Credit three or more hours. Messrs. BELCHER, HODGE, LEWIS, and PERRY.

2642. *TRANSPORTATION ENGINEERING RESEARCH.* Any term. Credit three or more hours. Messrs. BELCHER, HODGE, LEWIS, and PERRY.

2643. *TRANSPORTATION ENGINEERING SEMINAR.* Term arranged. Credit one to six hours. Staff.

TOPOGRAPHIC, GEODETIC, AND PHOTOGRAMMETRIC ENGINEERING

Professor A. J. MCNAIR and *Associate Professor* F. J. SPRY.

The preliminary training as a qualification for work in this field should include the equivalent of the regular undergraduate course in civil engineering.

Courses in cartography, geodetic astronomy, and engineering interpretation of aerial photographs are also available to students in this field.

2105. *LEAST SQUARES.* Adjustment of Observations. Term arranged. Three hours credit. Elective for upperclassmen and graduate students. Mr. SPRY.

2106. *ADVANCED TOPOGRAPHIC SURVEYING.* Credit two hours. Prerequisite, 2103. Elective for upperclassmen and graduate students. Mr. MCNAIR.

2107. *GEODESY AND GEODETIC LABORATORY.* Term arranged. Credit three hours. Prerequisites, 2102 and 2103. Staff. Elective for upperclassmen and graduate students.

2109. *MAP PROJECTIONS AND MAPPING.* Term arranged. Credit two hours. Mr. SPRY. Elective for upperclassmen and graduate students.

2120. *VERTICAL CONTROL.* Term arranged. Credit three hours. Prerequisites, Summer Survey 2103. Elective for upperclassmen and graduates. Mr. MCNAIR.

2121. *ELEMENTS OF PHOTOGRAMMETRY.* Any term. Credit three hours. Prerequisites, 2102. Mr. MCNAIR. Elective for upperclassmen and graduates.

2122. *ADVANCED PHOTOGRAMMETRY.* Term arranged. Credit three hours. Prerequisite, 2121. Mr. MCNAIR.

2123. *SURVEYING AND MAPPING INSTRUMENTATION.* Any term. Credit three hours. Prerequisite, 2121. Mr. MCNAIR.

2142. *GEODETIC OR PHOTOGRAMMETRIC ENGINEERING RESEARCH.* Prerequisites will depend upon the line of work to be pursued.

2143. *SEMINAR IN GEODESY OR PHOTOGRAMMETRY.* One to six hours credit. Elective. Staff.

HOME ECONOMICS

Courses offered in the College of Home Economics are numbered in accordance with the following plan: courses numbered below 300 are, in general, undergraduate courses; courses numbered 300 to 400 are for seniors and graduate students; courses numbered above 400 are for graduate students. The full description of the undergraduate courses will be found in the *Announcement of the College of Home Economics.*

Unless otherwise noted all classes meet in Martha Van Rensselaer Hall.

Attendance for at least one semester during the regular academic year is usually necessary for candidates for the Master's degree, Plan A.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS

Professors ROBERT DALTON, URIE BRONFENBRENNER, LEMO ROCKWOOD, ETHEL WARING; *Associate Professors* EDWARD DEVEREUX, MARY FORD, KATHERINE REEVES, RUSSELL SMART; *Acting Assistant Professors* HAROLD FELDMAN, and BETTY HATCH.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Child Development and Family Relationships 1, 2, 3, 4
Child Development 2, 3, 4
Child Guidance 2, 3, 4
Family Relations 2, 3, 4
Marriage 3, 4
Family Counseling 3, 4

As a basis for graduate work in child development and family relationships elementary courses in psychology, sociology and/or child development and family relationships are required. As a background for advanced work some experience in one of the following areas is also desirable: teaching or other experience with young children, school children, adolescents, or adults; social or clinical work; or extension teaching or administration.

Laboratory experience is provided in the Department nursery school, in public nursery schools, in play groups in the settlement houses, and in other organized groups. Insofar as facilities are available, graduate students are helped to find ways to put their knowledge into practice.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Child Development and Family Relationships, Courses 120, 140, 150.

303. *HISTORY AND PHILOSOPHY OF EARLY CHILDHOOD EDUCATION.* Spring term. Credit three hours. Associate Professor REEVES. M W F 10. Room 124. Preregistration required.

[305. *METHODS OF CHILD STUDY.* Spring term. Credit two hours. Primarily for seniors and graduate students. Limited to twelve students. Prerequisite, twelve or more credit hours in child development and family relationships and/or psychology, and Child Development and Family Relationships 330, or permission of the instructor. Associate Professor FORD. T Th 9. Room ——. Not offered in 1951–52.]

310. *PRINCIPLES OF CHILD GUIDANCE.* Fall and spring terms. Credit three hours. Observation in the Nursery School. Weekly small group discussions. Professor WARING. M W F 8. Room 121. Preregistration required.

315. *CHILD DEVELOPMENT.* Advanced course. Fall term. Credit three hours. Primarily for seniors and graduate students. Prerequisite, Child Development and Family Relationships 215 or equivalent. Associate Professor FORD. T Th S 9. Preregistration required.

325. *EXCEPTIONAL CHILDREN IN THE FAMILY.* Spring term. Credit three hours. Open to juniors, seniors, and graduate students. Prerequisite, six or more credit hours in child development and family relationships and/or psychology. Associate Professor FORD. M W F 9. Room 124. Preregistration required.

360. *PSYCHODYNAMICS OF HUMAN BEHAVIOR.* Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Limited to forty-five students. Prerequisite, one course in child development and family relationships or psychology. Professor DALTON. M W F 11. Room 124. Preregistration required.

361. *DYNAMICS OF FAMILY INTERACTION.* Fall term. Credit three hours. Limited to twenty graduate students. Professor ROCKWOOD. T Th 11–12:30. Room 121. Preregistration required.

370. *MARRIAGE.* Spring term. Credit three hours. Open to students from all colleges. Registration with permission of the instructor. Each section limited to 35 students. Professor ROCKWOOD. M W F 10 or 11. Lectures, large group discussions, small group discussions. Room 121. Preregistration required.

[373. *THE INFANT AND HIS FAMILY IN OUR CULTURE.* Spring term. Credit three hours. Open to juniors, seniors, and graduate students. Limited to twenty students. Associate Professor SMART. Not offered in 1951–52.]

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department Staff. Preregistration required.

[405. *SEMINAR — RESEARCH METHODS.* Fall term. Credit two hours. Not offered in 1951–52.]

407. *THESIS AND RESEARCH.* Fall and spring terms. Credit and hours to be arranged. Registration by permission of the instructor. Professors BRONFENBRENNER and WARING, Associate Professors DEVEREUX, FORD and REEVES, Assistant Professors FELDMAN and HATCH. Preregistration required.

415. *SEMINAR IN CHILD DEVELOPMENT.* Spring term. Credit three hours. Open to graduate students by permission of the instructor. Limited to twelve students. Prerequisite, Child Development and Family Relationships 360 or equivalent. Professor DALTON. Th 2–4:30. Room G 60–E. Preregistration required.

[420. *PROSEMINAR IN CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS.* Fall term. Credit three hours. Not offered in 1951–52.]

431. *SPECIAL PARTICIPATION AND NURSERY SCHOOL EDUCATION PROBLEMS.* Fall and spring terms. Credit and hours to be arranged. Associate Professor REEVES (Community Schools), Assistant Professor HATCH (Campus Nursery School). Preregistration required.

[440. *SEMINAR — THE FAMILY.* Throughout the year. Credit two hours. Not offered in 1951–52.]

450. *SEMINAR — CHILD GUIDANCE.* Spring term. Credit two hours. Prerequisite, some work in child development and family relationships. Professor WARING. Time to be arranged. First meeting W 4–6. Room G 60–E. Preregistration required.

462. *FAMILY SYSTEMS AND THE SOCIAL STRUCTURE.* Fall term. Credit three hours. Open to graduate students and properly qualified undergraduate students with the permission of the instructor. Limited to fifteen students. Associate Professor DEVEREUX. M W F 10. Room G 60–E. Preregistration required.

463. *SEMINAR IN SELECTED PROBLEMS OF THE FAMILY.* Spring term. Credit three hours. Open to graduate students and properly qualified undergraduates with permission of the instructor. Associate Professor DEVEREUX. Hours to be arranged. Preregistration required.

475. *FAMILY LIFE EDUCATION.* Spring term. Credit three hours. Professor ROCKWOOD. T 2–4 and one additional hour each week, to be arranged. Room ——. Preregistration required.

480. *PERSONAL COUNSELING.* Fall term. Credit three hours. Open to graduate students. Limited to twelve students. Prerequisite, several courses in child development and family relationships and/or psychology, and permission of the instructor. Assistant Professor FELDMAN. W 2–4:30. Room 301. Preregistration required.

ECONOMICS OF THE HOUSEHOLD AND HOUSEHOLD MANAGEMENT

Professors HELEN CANON, LUCILLE WILLIAMSON, ELLA M. CUSHMAN; *Associate Professors* MABEL ROLLINS, MARY KOLL HEINER, ——; *Assistant Professor* ESTHER C. BRATTON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Economics of the Household 2, 3, 4 Household Management 2, 3, 4

Students selecting a major in economics of the household and household management are expected to take courses in both phases of the field; for the Ph.D. degree the minor subjects are usually selected to support one phase or the other. Appropriate minor subjects may be chosen from a variety of fields including, besides other branches of home economics, agricultural economics, economics, education, psychology, sociology.

As a background for graduate work in this field, a well-rounded undergraduate program in home economics is preferable, in general, to specialization. Undergraduate courses in mathematics, statistics, economics, history, sociology, psychology, physics, chemistry, and bacteriology are also useful.

260. *PROBLEMS IN PROVIDING CONSUMERS' GOODS.* Fall term. Credit three hours. Open to undergraduate and graduate students. Prerequisite, Economics of the Household 430 or the equivalent. Associate Professor ROLLINS. T Th 2–3:30 and one additional hour at the convenience of the student. Room 121. Preregistration required.

310. *MANAGEMENT PROBLEMS IN HOMES.* Fall and spring terms. Credit three hours for graduate students. Graduate students should consult the instructor before registering. Professor CUSHMAN and Miss SNOWMAN. W F 2–4:20. One additional hour to be arranged. Room G–20. Preregistration required.

320. *MANAGEMENT IN RELATION TO HOUSEHOLD EQUIPMENT.* Spring term. Credit three hours. For juniors, seniors, and graduate students. Agricultural Engineering 10 or the equivalent, and Economics of the Household 310 desirable as a background. Professor WILLIAMSON. W F 11–1. Room G–19. Preregistration required.

330. *MANAGEMENT IN RELATION TO PERSONAL FINANCES.* Spring term. Credit three hours. For juniors, seniors, and graduate students. Prerequisite, Economics of the Household 430 or permission of the instructor. Associate Professor ———. M W F 9. Room 121. Preregistration required.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department Staff. Preregistration required. For graduate students recommended by their chairmen and approved by the head of the department and the instructor in charge for independent, advanced work.

407. *THESIS AND RESEARCH.* Fall and spring terms. Credit and hours to be arranged. Registration with permission of the instructor. Professors CANON, CUSHMAN, WILLIAMSON; Associate Professors ROLLINS, HEINER, ———; Assistant Professor BRATTON. Preregistration required.

408. *WORK SIMPLIFICATION IN HOME ECONOMICS.* Spring term. Credit two hours. Prerequisite, Economics of the Household 310 or permission of the instructor. Associate Professor HEINER. Th 2–4. Room 124. Preregistration required.

420. *HOME PROCESSES.* Spring term. Credit two hours. Students will attend specified lectures given by the instructors in Economics of the Household 128. The instructor should be consulted before registering. Miss PURCHASE. Lecture, M W 10. Amphitheatre. Laboratory, M 11–1. Room G–19. Preregistration required.

430. *ECONOMIC CONDITIONS IN RELATION TO THE WELFARE OF FAMILIES.* Fall and spring terms. Credit three hours. Graduate section of 130. Associate Professor ROLLINS. M W F 11 and one additional hour to be arranged. Amphitheatre. Preregistration required.

432. *PERSONAL FINANCES.* Fall term. Credit two hours. Prerequisite, Economics of the Household 330 or the equivalent. The instructor should be consulted before registering. Associate Professor ———. F 2–4. Room 133. Preregistration required.

461. *PROBLEMS IN THE DISTRIBUTION OF CONSUMERS' GOODS.* Spring term. Credit two hours. Prerequisite, Economics of the Household 260 or the equivalent. The instructor should be consulted before registering. Associate Professor ROLLINS. F 2–4. Room 124. Preregistration required.

490. *REVIEW OF RESEARCH IN HOME MANAGEMENT.* Fall term. Credit two hours. Prerequisite or parallel, Economics of the Household 310. The instructor should be consulted before registering. Professor CANON. Th 2–4. Room 108. Preregistration required.

495. *ECONOMIC PROBLEMS OF FAMILIES.* Spring term. Credit two hours. The instructor should be consulted before registering. Professor CANON. Hours to be arranged. Room 108. Preregistration required.

499. *SEMINAR.* Fall and spring terms. Department STAFF. T 4–5:15. Room 114. Preregistration required.

See also Home Economics Education 485, *SUPERVISION OF RESIDENT EXPERIENCE IN HOMEMAKING,* page 166.

FOOD AND NUTRITION

Professors FAITH FENTON, HAZEL HAUCK, L. A. MAYNARD, C. M. MCCAY, CATHERINE PERSONIUS, MARION PFUND, GRACE STEININGER; *Associate Professors* ALICE BRIANT, FRANCES JOHNSTON, KARLA LONGRÉE, CHARLOTTE YOUNG; *Assistant Professor* BETTY STEELE.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Food and Nutrition 1, 2, 3, 4 Food 1, 2, 3, 4

Nutrition 1, 2, 3, 4

As a basis for graduate work in food and nutrition, elementary courses in home economics and courses in inorganic and organic chemistry are expected. A knowledge of quantitative chemical analysis, biochemistry, physiology, bacteriology, physics, physical chemistry, and statistics is desirable.

Before applying for admission to the Graduate School a prospective student is advised to communicate with a member of the Faculty in the field in which she wishes to do research or with the chairman of the department, Professor PERSONIUS.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Food and Nutrition, Courses 103, 190, 214, 215, 225, 230, 240, 260.

305. *FOOD DEMONSTRATIONS.* Fall and spring terms. Credit one hour. Prerequisites, Food and Nutrition 215 or 225. Registration with permission. Associate Professor FOSTER. T Th 2:30–4. Fall, Room 361; Spring, Room 352. Preregistration required.

314. *SCIENCE IN FOOD PREPARATION.* Fall term. Credit three hours. Prerequisites, Food and Nutrition 215 or 225 and Biochemistry 10. Registration with permission. Professor PERSONIUS. Lectures, T Th 8. Room 339. Laboratory, F 2–4. Room 358. Preregistration required.

315. *SCIENCE IN FOOD PREPARATION. INTRODUCTORY EXPERIMENTAL COOKERY.* Spring term. Credit three hours. Prerequisite, Food and Nutrition 314. Registration with permission. Professor FENTON. Lectures, T Th 8. Room ——. Laboratory, S 8–11. Room 358. Preregistration required.

330. *DIET THERAPY.* Fall term. Credit three hours. Prerequisite, Food and Nutrition 230 or equivalent. Registration with permission. Professor HAUCK. M W F 9. Room 426. Preregistration required.

340. *MATERNAL AND CHILD NUTRITION.* Fall and spring terms. Credit two hours. Prerequisite, Food and Nutrition 103 or 190. Not open to students who take Food and Nutrition 230. Miss NEWMAN. W F 8. Room 339. Preregistration required.

342. *CHILD FEEDING LABORATORY.* Spring term. Credit one hour. Prerequisite or parallel, Food and Nutrition 340 or equivalent. Miss NEWMAN. Th 10–12. Room 352. Preregistration required.

360. *SEMINAR IN FOOD AND NUTRITION.* Fall term. Credit one hour. Primarily for seniors; open to graduate students. Prerequisites, Elementary Nutrition and Food and Nutrition 215 or 225. Professor FENTON and Miss NEWMAN. Th 2. Room 301. Preregistration required.

[400. *READINGS IN NUTRITION.* Fall term. Credit two hours. Registration with permission. Professor HAUCK. T Th 11. Preregistration required. Offered in alternate years. Not offered in 1951–52.]

401. *READINGS IN NUTRITION.* Fall term. Credit two hours. Registration with permission. Professor HAUCK. T Th 11. Room 301. Preregistration required. Offered in alternate years.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department Staff. Preregistration required.

407. *THESIS AND RESEARCH.* Fall and spring terms. Credit and hours to be arranged. Registration with permission. Professors FENTON, HAUCK, MAYNARD, MCCAY, PERSONIUS, PFUND, and STEININGER; Associate Professors BRIANT, JOHNSTON, LONGRÉE, and YOUNG; Assistant Professor STEELE. Preregistration required.

414. *ADVANCED EXPERIMENTAL COOKERY.* Fall term. Credit three hours. Prerequisite, Food and Nutrition 315 or equivalent. Registration with permission. Professor PFUND. T Th 10–1. Room 358. Preregistration required.

420. *ADVANCED SEMINAR IN NUTRITION.* Fall term. Credit one hour. Assistant Professor STEELE and Department Staff. T 4:30. Room 301. Preregistration required.

421. *ADVANCED SEMINAR IN FOOD.* Spring term. Credit one hour. Professor FENTON and Department Staff. T 4:30. Room 301. Preregistration required.

440. *NUTRITION OF GROWTH AND DEVELOPMENT.* Spring term. Credit two hours. Prerequisite, Food and Nutrition 230 or equivalent. Professor STEININGER. T Th 11. Room 301. Preregistration required.

Note: Attention is called to the courses offered in other departments of the University and listed in the *Announcement of the School of Nutrition.*

HOME ECONOMICS EDUCATION

Professor MARGARET HUTCHINS; *Associate Professors* HELEN HOEFER, IRENE PATTERSON; *Assistant Professors* SARA BLACKWELL, CAROLYN CRAWFORD, HELEN MOSER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Home Economics Education 1, 2, 3, 4

The types of advanced degrees for which graduate students majoring in Home Economics Education may become candidates are: (1) Master of Science (Plan A or Plan B); (2) Master of Science in Education; (3) Doctor of Philosophy; (4) Doctor of Education.

As a basis for graduate work in Home Economics Education, an undergraduate major in home economics and some courses in Education are expected. Some experience with children and adults, such as teaching in extension and in schools, is advisable, and may be accepted in some cases in lieu of undergraduate courses in Education. The Department offers opportunities for field experience in extension and school programs at all age levels.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Home Economics Education, Courses 320, 321, 330, 331.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Department Staff. Credit and hours to be arranged. For graduate students recommended by their chairmen and approved by the instructor in charge for independent advanced work.

407. *THESIS AND RESEARCH.* Fall and spring terms. Registration with permission of the chairman of the graduate committee and the instructor. Professor HUTCHINS; Associate Professors HOEFER, PATTERSON; Assistant Professors BLACKWELL, CRAWFORD, MOSER. Credit and hours to be arranged.

[435. *METHODS AND MATERIALS IN TEACHING HOME ECONOMICS.* Fall term. Credit two hours. Professor HUTCHINS. Not given in 1951–52.]

437. *ADULT EDUCATION.* Fall term. Credit two or three hours. Associate Professor PATTERSON. M 4 and other hours to be arranged. Room 124. Preregistration required. Estimated cost of transportation, $3 to $5.

[438. *TEACHING HOMEMAKING TO ADULTS.* Fall and spring terms. Credit two or three hours. Associate Professor PATTERSON. Not given in 1951–52.]

439. *THE TEACHING OF HOME ECONOMICS.* Fall term. Credit three hours. Associate Professor PATTERSON. T 10 and other hours to be arranged. Room 124. Preregistration required.

[448. *TEACHER EDUCATION IN HOME ECONOMICS.* Credit two hours. Staff. Not given in 1951–52.]

449. *CURRICULUM PLANNING IN HOME ECONOMICS.* Fall term. Credit two or three hours. Assistant Professor BLACKWELL. S 10–12. Room 301. Preregistration required. Estimated transportation cost, $3.

459. *EVALUATION.* Spring term. Credit three hours. Assistant Professor BLACKWELL. W 11–1, F 11. Room 301. Preregistration required.

469. *ADMINISTRATION AND SUPERVISION OF HOME ECONOMICS.* Spring term. Credit two hours. Professor HUTCHINS. M 4–6. Room 121. Preregistration required. Estimated cost of transportation, $5.

[479. *RESEARCH IN HOME ECONOMICS EDUCATION.* Credit two hours. Not given in 1951–52.]

480. *SEMINAR IN HOME ECONOMICS EDUCATION.* Fall and spring terms. Credit one hour. Department Staff. W 4–6. Room 124. Preregistration required.

[481. *SEMINAR IN SUPERVISION IN HOME ECONOMICS EDUCATION.* Spring term. Credit two hours. Department Staff. Not given in 1951–52.]

485. *SUPERVISION OF THE RESIDENT EXPERIENCE IN HOMEMAKING.* Spring term. Credit two hours. Assistant Professor CRAWFORD. T 9–11. Apartment A. Preregistration required.

HOUSING AND DESIGN

Professors VIRGINIA TRUE, GLENN H. BEYER; *Associate Professors* HELEN J. CADY, DORA W. ERWAY, JAMES E. MONTGOMERY, SARAH NEBLETT, MABEL WILKERSON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Housing and Design 1, 2, 3, 4

Graduate work for the Master's degree and the Doctor's degree is offered in housing and design.

Before entering upon advanced work in housing and design the student should have had basic courses in color and design, house planning, interior design, family life, household management, sociology, and economics. Whether a student's preparation is adequate for advanced study can be determined only by special consideration of each case.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Housing and Design.

305. *FASHION ILLUSTRATION.* Spring term. Credit three hours. Prerequisites, Housing and Design 100 and Architecture 340, or the equivalent. Clothing courses desirable. Miss Straight. W F 10–1. Room 322. Preregistration required. Minimum materials, $7.

311. *APPLIED TEXTILE DESIGN.* Spring term. Credit two hours. Limited to nine students. Prerequisite, Housing and Design 220. Associate Professor Erway. M W 8–10. Room 318. Preregistration required.

319. *CONTEMPORARY DESIGNERS.* Spring term. Credit two hours. Prerequisite, Housing and Design 100. Professor True. T Th 11. Room 317. Preregistration required.

320. *HISTORIC FURNITURE AND INTERIOR DESIGN.* Fall term. Credit two hours. Prerequisite, Housing and Design 220. Associate Professor Wilkerson. T Th 11. Room 317. Preregistration required.

325. *INTERIOR DESIGN: EMPHASIS ON DESIGN OF FURNITURE AND BACKGROUND OF ROOMS.* Fall term. Credit three hours. Prerequisite, Housing and Design 220. Limited to fifteen students. Associate Professor Cady. Lecture F 2. Room 317. Laboratory M W 2–4. Room 327. Preregistration required.

339. *SEMINAR IN INTERIOR DESIGN.* Spring term. Credit one hour. For upperclassmen and graduate students. Associate Professor Wilkerson and Department Staff. T 4. Room 3M 11. Preregistration required.

346–347. *INTRODUCTION TO HOUSING.* Fall and spring terms. Credit three hours each term. First registration may be in either term. Open to upperclassmen and graduate students with consent of the instructor. Associate Professor Montgomery. M W F 9. Room 3M 11. Preregistration required.

348–349. *SOCIAL ASPECTS OF HOUSING.* Fall and spring terms. Credit three hours each term. First registration may be in either term. Both terms recommended but not required. Prerequisites, Housing and Design 346 and 347, or consent of instructor. Open to qualified upperclassmen and graduate students. Associate Professor Montgomery. M W F 11. Room 3M 11. Preregistration required.

400. *SEMINAR IN CURRENT HOUSING PROBLEMS.* Spring term. Credit three hours. Registration by permission of instructor, based upon student's training, experience, and interest. Professor Beyer and outside speakers. M 4–6. Room 3M 11. Preregistration required.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department Staff. Preregistration required. For graduate students recommended by their chairmen and approved by the head of the department in charge for independent, advanced work.

407. *THESIS AND RESEARCH.* Fall and spring terms. Registration with permission of the instructor. Professors True and Beyer, Associate Professors Cady, Erway, Montgomery, Neblett, Wilkerson. Preregistration required.

410. *RESEARCH METHODS IN HOUSING AND DESIGN.* Fall term. Credit one hour. Recommended to upperclassmen having a special interest in housing and design and to graduate minors in the Department. Required of housing

and design majors. Associate Professor MONTGOMERY. Th 9. Room 3M 11. Preregistration required.

425. *INTERIOR DESIGN.* Spring term. Credit three hours. Prerequisites, Housing and Design 220 and 325. Limited to fifteen students. Associate Professor NEBLETT. W F 1:30. Room 401 B. Preregistration required.

INSTITUTION MANAGEMENT

Professor KATHARINE W. HARRIS, *Associate Professors* KARLA LONGRÉE, HELEN RIPLEY.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Institution Management 2, 4

Advanced work in institution management requires undergraduate courses in this subject and/or food and nutrition with some administrative experience in the field of managerial dietetics.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Institution Management, Courses 220, 230, 240.

310. *CATERING.* Fall and spring terms. Credit three hours. Permission of the instructor required. Prerequisite, Institution Management 200, 210, or 230, or equivalent experience. Special catering assignments require 15 to 20 hours in addition to the scheduled laboratories. Assistant Professor RIPLEY and Miss ——. Fall term, T or Th 8:30–2, or W 2–7:30; spring term, T or Th 8:30–2. Discussion S 9. Green Room. Preregistration required.

320. *INSTITUTION ORGANIZATION AND ADMINISTRATION.* Spring term. Credit three hours. Advised for all students specializing in institution management or dietetics. Prerequisites, Institution Management 230 and Hotel Accounting 240 or equivalent courses. Registration by permission of the instructor. Professor HARRIS. M F 2–4. Room 124. Preregistration required.

330. *QUANTITY FOOD PREPARATION AND CATERING, ADVANCED COURSE.* Fall and spring terms. Credit five hours. Permission of the instructor required. Prerequisites, Institution Management 200, 210, or 230, or equivalent courses. Special catering assignments require 25 to 30 hours in addition to the scheduled laboratories. Assistant Professor RIPLEY. T Th 8:30–2. Lecture and discussion, S 9. Conference hours by appointment. Green Room. Preregistration required.

350. *INSTITUTION PRACTICE.* Fall and spring terms. Credit three hours. Open to a limited number of graduate students specializing in institution management, with the permission of the instructor. Practice assignments require approximately 10 hours a week for the full semester. Conference hours to be arranged. Students will meet with the instructor the first day of the semester, 4–5, G64. Professor HARRIS. Preregistration required.

400. *READINGS IN INSTITUTION MANAGEMENT.* Spring term. Offered in alternate years. Credit one hour. Registration with permission of the instructor. Professor HARRIS and departmental Staff. One hour to be arranged. Preregistration required.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department Staff. Preregistration required.

407. *THESIS AND RESEARCH.* Fall and spring terms. Registration with permission of the instructor. Professor HARRIS; Associate Professors LONGRÉE, RIPLEY. Credit and hours to be arranged. Preregistration required.

[410. *SEMINAR IN INSTITUTION ORGANIZATION AND ADMINISTRATION PROBLEMS.* Spring term. Offered in alternate years. Credit one hour. For students with adequate training in institution management. Professor HARRIS; Associate Professor LONGRÉE, and departmental Staff. M 7:30–9 P.M. Preregistration required. Not given in 1951–52.]

Note: Attention is called to courses listed in the Announcements of the following schools: Hotel Administration, Industrial and Labor Relations, and Nutrition.

TEXTILES AND CLOTHING

Professor BEULAH BLACKMORE; *Associate Professors* GLADYS BUTT, MARGARET HUMPHREY, ELSIE FROST MCMURRY, RUTH SCOTT, JANE WERDEN; *Assistant Professor* RYAN.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Textiles and Clothing 2, 4

A well balanced home economics undergraduate program is a desirable background for graduate work in textiles and clothing. In addition, desirable and appropriate undergraduate courses may be chosen from the fields of history, dramatic production, fine arts, languages, journalism, public speaking, chemistry, and economics.

Graduate work in textiles and clothing may emphasize either the economic, sociological, educational, technical, or art aspects of the subject. It is expected that courses will be selected from the area of textiles as well as clothing.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Textiles and Clothing, Courses 100, 101, 110, 130, 150, 200, 210.

235. *SCIENCE RELATED TO TEXTILES.* Spring term. Credit two hours. Prerequisites, Food and Nutrition 215 or elementary organic chemistry or the equivalent; Textiles and Clothing 130 or 310. Assistant Professor WHITE. W F 8–10. Room 353. Preregistration required.

310. *HOUSEHOLD TEXTILES.* Spring term. Credit two hours. See Textiles and Clothing 410 and consult with instructor. Associate Professor WERDEN. T Th 9–11. Room 278.

320. *PROBLEMS IN BUYING CLOTHING.* Spring term. Credit three hours. Associate Professor WERDEN. M W F 11–1. Preregistration required.

330. *HISTORY OF COSTUME.* Fall term. Credit three hours. Associate Professor MCMURRY. M W F 2. Room 215. Preregistration required.

340. *ADVANCED DRESSMAKING.* Fall term. Credit three hours. Prerequisite, Textiles and Clothing 200 or the equivalent. Registration limited to sixteen students. Associate Professor HUMPHREY. T Th 9–12. Room 234. Estimated cost of materials, $20 to $35. Preregistration required.

345. *TAILORING.* Spring term. Credit three hours. Prerequisite, Textiles and Clothing 200 or the equivalent. Registration limited to sixteen students. Associate Professor HUMPHREY. T Th 9–12. Room 234. Preregistration required. Estimated cost of materials, $25 to $50.

350. *TEXTILES: ADVANCED COURSE.* Fall and spring terms. Credit two hours. Prerequisite, Textiles and Clothing 130 or 310 or the equivalent. Assistant Professor WHITE. W F 11–1. Room 278. Preregistration required. Estimated cost of materials, $5 to $15.

400. *DRESS DESIGN, ADVANCED COURSE.* Spring term. Credit three hours. Prerequisites, Textiles and Clothing 200 and 340 or their equivalent. Textiles and Clothing 330 recommended. Associate Professor MCMURRY. T Th 1:40–4:30. Room 217. Preregistration required.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department Staff. Preregistration required. For graduate students recommended by their chairmen and approved by the head of the department and the instructor in charge for independent, advanced work.

407. *THESIS AND RESEARCH.* Fall and spring terms. Registration with permission of the instructor. Professor BLACKMORE, Associate Professors BUTT, HUMPHREY, MCMURRY, SCOTT, WERDEN. Preregistration required.

410. *SEMINAR IN TEXTILES.* Spring term. Credit one hour. Parallel course, Textiles and Clothing 310. Consult the instructor before registering. Associate Professor WERDEN. Hours to be arranged.

430. *SEMINAR IN CLOTHING.* Spring term. Two hours by arrangement. Assistant Professor RYAN in charge. Room 216. Preregistration required.

HOTEL ADMINISTRATION

Professors H. B. Meek, F. H. Randolph, Louis Toth, John Courtney, C. I. Sayles, C. E. Cladel, T. W. Silk, H. J. Recknagel, G. W. Lattin.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Hotel Administration 1, 2, 4 Hotel Accounting 2, 3, 4

Graduate work in the field of hotel administration is open to those who have completed in full the requirements for the undergraduate degree in the School of Hotel Administration or their equivalent and to them only.

Students who hold Bachelors' degrees in the liberal arts or in general business administration who wish a program in hotel administration normally enroll in the undergraduate division. They may become candidates for an additional Bachelor's degree or at their choice enroll simply for a specialized program of hotel administration courses suited to their particular needs. Full information is contained in the *Announcement of the School of Hotel Administration.*

To those who are qualified to pursue advanced work, programs leading either to the Master's degree or the Doctor's degree are offered.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the School of Hotel Administration,* Courses 81, 82, 114, 181, 182, 183, 184, 187, 240, 282, 283, 340, 261, 262, 264. Preregistration required.

HOTEL PLANNING (Hotel Engineering 265). Fall term, to be repeated in the spring term. Credit three hours. Open to seniors and graduate students. Professor Randolph. Preregistration required.

HOTEL STRUCTURES AND MAINTENANCE. (Hotel Engineering 266). Fall term. Credit three hours. Professor Sayles. Preregistration required.

HOTEL ACCOUNTING PROBLEMS (Hotel Accounting 185). Spring term. Credit two hours. Prerequisite, Hotel Accounting 182 or its equivalent. Assistant Professor Toth.

INTERPRETATION OF HOTEL FINANCIAL STATEMENTS (Hotel Accounting 186). Spring term. Credit two hours. Prerequisite, Hotel Accounting 182 or its equivalent. Assistant Professor Toth. Preregistration required.

PROBLEMS IN ANALYSIS AND INTERPRETATION (Hotel Accounting 189). Fall term, to be repeated in the spring term. Credit two hours. Registration limited. Associate Professor Courtney.

SEMINAR IN HOTEL ADMINISTRATION (Hotel Administration 153). Fall term, to be repeated in the spring term. Credit two hours. Registration limited. Professor Meek. Preregistration required.

PERSONNEL ADMINISTRATION IN HOTELS (Hotel Administration 119). Fall term, to be repeated in spring term. Credit three hours. Prerequisite, Hotel Administration 114 or its equivalent. Assistant Professor Lattin. Preregistration required.

INDUSTRIAL AND LABOR RELATIONS

Professors M. P. CATHERWOOD, L. P. ADAMS, C. K. BEACH, E. BROOKS, J. M. BROPHY, T. BURLING, R. N. CAMPBELL, M. G. CLARK, L. A. EMERSON, R. H. FERGUSON, P. GORDON, C. A. HANSON, J. J. JEHRING, V. H. JENSEN, M. R. KONVITZ, D. MACINTYRE, P. J. MCCARTHY, J. W. MCCONNELL, JEAN T. MCKELVEY, J. G. MILLER, J. E. MORTON, PHILOMENA MULLADY, M. F. NEUFELD, N. A. TOLLES, W. F. WHYTE, B. F. WILLCOX.

DEGREES OFFERED

The Division of Industrial and Labor Relations offers an opportunity for candidacy for the degrees of Master of Science in Industrial and Labor Relations (M.S. in I.L.R.), Master of Science (M.S.), and the Ph.D. Students interested in working for the degree of Master of Science in Education (M.S. in Ed.) may become candidates for this degree with specialization in industrial education.

The degree of Master of Science in Industrial and Labor Relations (M.S. in I.L.R.) provides for broad coverage in the field of industrial and labor relations plus a limited opportunity for specialization for those candidates who anticipate general professional work but who have limited previous training in the field. The Master of Science (M.S.) provides for specialization in selected areas of study for those with more specific interest and with substantial previous preparation in the field. The specific Master's degree (M.S. or M.S. in I.L.R.) for which the applicant may become a candidate will be determined after consideration of the previous academic preparation, experience, and objectives of the candidate. The Master of Science in Education with a major in industrial education (M.S. in Ed.) is designed to prepare persons with experience in industrial arts or vocational or technical education for advanced positions in teaching and administration.

Work leading to the degree of Doctor of Philosophy (Ph.D.) is designed to give the candidate a thorough knowledge of selected areas as well as comprehension of the broad field of industrial and labor relations and to train him in the methods of research and scholarship in the field. The doctoral candidate is expected to maintain a high degree of achievement and to show evidence of ability in independent investigation and study.

The program requirements for both the degree of Master of Science in Industrial and Labor Relations and Master of Science are such that under most circumstances a minimum of three terms of study will be necessary. More than three terms may be required, depending on the adequacy of prior preparation, the academic work load, and similar factors. Less than three terms of study but not less than two terms of academic residence credit in the School may satisfy the requirements for the Master of Science degree in cases where the candidate has had unusually adequate preparation before entering candidacy.

DEGREE REQUIREMENTS

Requirements for the degrees of Master of Science and Doctor of Philosophy are described in the first part of this Announcement.

In addition to thesis requirements described elsewhere in this Announcement, the candidate for the Master's or Doctor's degree majoring in this field must provide the Library of the School of Industrial and Labor Relations with a copy of the completed thesis or problem.

The degree of Master of Science in Industrial and Labor Relations is under the special jurisdiction of this Division. A candidate for the degree of M.S. in I.L.R. follows a program outlined by the Division. Included in the program for the M.S. in I.L.R. candidate are four basic requirements as follows:

(1) Candidates will be required to demonstrate competence in each of the eight subject matter fields of the School. This requirement may be satisfied in any one of three ways: (a) by enrolling in and completing the basic course listed for the particular area; (b) by passing the final course examination in the basic course without having enrolled in the course; (c) by exempting the basic course upon recommendations of the adviser and the instructor in the basic course and upon the submission by the instructor of appropriate evidence indicating basis for exemption. Final action with respect to exemptions is determined by the Graduate Committee. Candidates who demonstrate competence in meeting requirement (1) by examination or by exemption may elect, in consultation with their adviser, other courses or seminars to fill out their program. In any case, however, a total of eight courses or seminars will be needed to satisfy this requirement. The basic courses under (1) are described on page 174.

(2) Candidates will be required, in addition, to complete satisfactorily four graduate seminars or courses either within the School or elsewhere in the University determined in consultation with the student's adviser. One of the four seminars or courses shall be in report writing. This seminar is planned as one which will provide practice in the finding of material and presentation in appropriate report form. It is expected to be taken early in the student's graduate program.

(3) The candidate must remove any deficiency in the required minimum of nine months of work experience. (Note admission requirements for this degree, page 174.)

(4) The candidate must satisfactorily complete a final comprehensive examination in the field of industrial and labor relations. The comprehensive examination shall be taken near the end of the third term unless, in the opinion of the Graduate Committee, unusual circumstances warrant a change. The result of the student's comprehensive examination and grades in course work will constitute the basis for recommendation for the degree by the Division.

SELECTION OF GRADUATE STUDENTS

Admission to graduate standing is determined by the Dean of the Graduate School. Candidates for advanced degrees in the field of industrial and labor relations will be recommended to the Dean of the Graduate School for admission in terms of the following criteria:

1. *The nature and quality of previous academic preparation:* (a) For M.S. in I.L.R.: The applicant should have undergraduate preparation in business administration, engineering, liberal arts, or other appropriate fields of such quality and breadth as to indicate his competence for graduate study in industrial and labor relations; (b) For M. S. or Ph.D.: The applicant should have previous academic training in the social sciences, with emphasis in one or more of the following fields: economics, industrial relations, industrial education, labor problems, personnel management, psychology, sociology, statistics; (c) For M.S. in Ed. (with major in industrial education): The applicant should have a background including trade, technical, or industrial arts training and/or relevant industrial or teaching experience.

2. *The capacity for graduate study:* Submission of scores for the Graduate Record Examination and other test data is recommended and may be required. In addition the School desires interviews with all applicants for graduate study.

3. *Work experience:* Practical experience with labor, management, and government agencies dealing with industrial and labor relations or, with respect to those with a major in industrial education, experience in industrial teaching or administration of industrial education is an important aspect of the admission requirement.

For admission to candidacy for the degree of M.S. in I.L.R., the candidate must present a minimum of nine months of approved full-time work experience of a suitable nature or a plan for obtaining it before completion of the course requirement for the degree.

Persons interested in admission to graduate study in this field should write to the Dean of the Graduate School, Cornell University, for application material and should return such material when completed to the Dean of the Graduate School.

Fellowships in Industrial Psychiatry

Funds granted to Cornell University by the Carnegie Corporation of New York permit the appointment of fellows in industrial psychiatry. The purpose of the fellowships is to provide an opportunity for trained psychiatrists to study at the New York State School of Industrial and Labor Relations and to apply psychiatric knowledge and methods to the problems of industry in actual plant situations. The fellowships are granted for a period of two years. Applicants must hold an M.D. degree and have completed a minimum of two years of approved training in psychiatry. These fellowships are administered by the School of Industrial and Labor Relations.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Collective Bargaining, Mediation, and Arbitration 1, 2, 3, 4

Economic and Social Statistics 1, 2, 3, 4

Human Relations 1, 2, 3, 4

Industrial and Labor Problems 4

Industrial Education 1, 2, 3, 4

Labor Market Economics and Analysis 1, 2, 3, 4

Labor Union History and Administration 1, 2, 3, 4

Personnel Administration 1, 2, 3, 4

Social Security and Protective Labor Legislation 1, 2, 3, 4

Candidates for the degrees of Master of Science and Doctor of Philosophy proposing to major or minor in industrial and labor relations must select areas of specialization from the above subjects. Candidates for the doctorate with a major within the field of industrial and labor relations are encouraged to take one of their two minors outside this field. Candidates for the Master of Science in Industrial and Labor Relations do not select majors or minors, but rather follow a program designed to provide broad coverage and some specialization in the field of industrial and labor relations.

For both the M.S. and Ph.D. degrees emphasis is placed upon independent study and research. The following are minimum requirements prerequisite to the independent investigations required for these degrees:

COLLECTIVE BARGAINING, MEDIATION, AND ARBITRATION. For a major in this subject, the candidate must show knowledge of: (1) the history, current developments, and issues in labor relations, collective bargaining practices and procedures; (2) the content of trade agreements in different types of industry; (3) state and federal legislation in the field of labor relations, collective bargain-

ing, mediation, and arbitration; (4) leading cases in the field of labor law; (5) administrative agencies and their functions. For a minor, (1), (3), and (5) are required.

ECONOMIC AND SOCIAL STATISTICS. For a major in this subject the candidate must show: (1) good command of the principles of statistical reasoning; (2) proficiency in the use of statistical methods and in the processing of statistical data; (3) qualified skill in the application of proper statistical tools of analysis to a specific topic in economics or social studies, including a thorough knowledge of statistical sources; (4) knowledge of differential and integral calculus. For a minor, (1), (2), (3) are required, the level being less advanced than for a major.

HUMAN RELATIONS. For a major in this subject, the candidate must present: (1) acquaintance with the fields basic in human and social behavior, including biology, the physiology of the nervous system, and the psychology of the individual; (2) comprehensive knowledge of relevant areas in social psychology and cultural anthropology, especially the fundamentals of individual and group behavior and the nature of institutions; (3) familiarity with the principal human relations problems commonly found in industrial and labor relations and the bearing of these problems on other fields such as collective bargaining, labor organization, management organization, economics, and law; (4) knowledge of the problems involved in the relationship between industries and communities; (5) thorough knowledge of pertinent research techniques and methods employed in human relations problems; (6) knowledge of resources generally available in educational techniques and in community services that have bearing on human relations problems. For a minor, (1), (2), and (3) are required.

INDUSTRIAL AND LABOR PROBLEMS. (Offered as a minor only to graduate students in fields of study other than Industrial and Labor Relations.) A candidate for an advanced degree must have a general understanding of the subject matter in the field of industrial and labor relations. In order to prepare for a minor in this field, the candidate will normally complete three to five courses in accordance with a program approved by his special committee.

INDUSTRIAL EDUCATION. For a major in this subject, the candidate must show: (1) comprehensive understanding of industrial and technical education programs in public institutions, private institutions, and industry; (2) ability to develop analyses for instructional purposes and prepare an educational or training program based upon analyses; (3) understanding of economic, social, and scientific factors which may modify industrial and technical education programs; (4) understanding of instructional methods and their application in learning situations; (5) ability to apply administrative and supervisory principles to industrial and technical education programs; (6) detailed knowledge of bibliographies and sources of information in this field. For a minor, (1), (2), (4) are required.

LABOR MARKET ECONOMICS AND ANALYSIS. For a major in this subject, the candidate must show: (1) comprehensive knowledge of the factors governing labor supply and demand; (2) thorough understanding of basic economic processes, especially in relation to employment, national income, production, wages, prices, and profits; (3) qualified skill in analyzing some specific labor market relationship such as manpower, labor mobility, wage determination, wage differentials, changes in wage structures, productivity, labor costs, or consumer incomes and expenditures; (4) competence in the use and application of quantitative methods; (5) knowledge of the history and the literature related to the subject. For a minor, (1), (2), and (4) are required. When this subject is elected as a major, labor economics may not be elected as a minor.

LABOR UNION HISTORY AND ADMINISTRATION. For a major in this subject, the candidate must present: (1) a working knowledge of the history of the American labor movement; (2) a working knowledge of the government and administration of the American labor movement; (3) specific and detailed knowledge of the history, government, and administration of international and national labor unions in the United States; (4) familiarity with types of union leadership and rank-and-file behavior; (5) familiarity with the history, government, and administration of labor movements in other countries; (6) detailed knowledge of the bibliography and sources of information in this field. For a minor in this subject (1), (2), and (6) are required.

PERSONNEL ADMINISTRATION. For a major in this subject, the candidate must present: (1) comprehensive knowledge of the general principles of administration, including personnel organization and operation; (2) ability to appraise critically personnel methods and procedures; (3) knowledge of labor and industrial legislation and functions of government as they relate to the personnel function; (4) knowledge of business and labor organizations and their impact on personnel relations; (5) insight concerning the basic attitudes modifying the relationships between individuals, groups, and organizations; (6) detailed knowledge of the bibliography and sources of information in this field. For a minor, (1), (2), (3), and (6) are required.

SOCIAL SECURITY AND PROTECTIVE LABOR LEGISLATION. For a major in this subject, the candidate must show; (1) familiarity with the sources and nature of insecurity; (2) a comprehensive knowledge of the origin, development, constitutionality, and administration of legislation in such fields as labor relations, minimum wage, hours, protection of women and children, discrimination and civil rights, health and safety, workmen's compensation, and social insurance; (3) a knowledge of the efforts of labor, industry, and the community to meet these problems on a voluntary basis; (4) familiarity with one special field of legislation, and the administrative and legal experience in that field; (5) knowledge of the past and current proposals for improving and extending legislation. For a minor, (1), (2), and (5) are required.

GRADUATE COURSES AND SEMINARS

Those courses designated in the 500 series are designed primarily for students in candidacy for the M.S. in I.L.R. degree and are open to other graduate students upon consent of instructor.

500. *COLLECTIVE BARGAINING, MEDIATION, AND ARBITRATION.* Fall and spring term.

510. *ECONOMIC AND SOCIAL STATISTICS.* Fall and spring terms.

520. *HUMAN RELATIONS.* Spring term.

530. *INDUSTRIAL EDUCATION.* Fall and spring terms.

540. *LABOR MARKET ECONOMICS.* Prerequisites, six semester hours of college economics or consent of instructor. Fall term.

550. *LABOR UNION HISTORY AND ADMINISTRATION.* Fall term.

560. *PERSONNEL ADMINISTRATION.* Fall term.

570. *SOCIAL SECURITY AND PROTECTIVE LABOR LEGISLATION.* Spring term.

590. *RESEARCH METHODS AND REPORT WRITING.* Fall and spring terms.

600. *COLLECTIVE BARGAINING — LABOR RELATIONS LAW AND LEGISLATION.* Fall term.

601. *COLLECTIVE BARGAINING — CONTRACTUAL RELATIONS.* Fall and spring terms.

602. *PROBLEMS IN LABOR LAW.* Spring term.

610. *ECONOMIC STATISTICS.* Fall term.

[611. *PROCESSING OF STATISTICAL DATA.* Spring term. Prerequisite, one statistics course and permission of instructor. Not offered in 1951–52.]

620. *METHODS OF HUMAN RELATIONS RESEARCH.* Fall term. Prerequisite, consent of instructor. (Students are expected to meet the transportation cost of field trips.)

622. *THE DYNAMICS OF PERSONALITY.* Spring term. Permission of the instructor is required.

630. *SUPERVISION OF INDUSTRIAL EDUCATION.* Summer term.

631. *INDUSTRIAL EDUCATION.* Spring term.

632. *ADMINISTRATION OF INDUSTRIAL EDUCATION.* Summer term.

633. *RESEARCH PRACTICES IN INDUSTRIAL EDUCATION.* Summer term.

634. *INDUSTRIAL EDUCATION IN SMALLER COMMUNITIES.* Summer term.

640, 641. *LABOR MARKET ECONOMICS.* This course is offered throughout the year, but students may be admitted either the first or second term.

650. *LABOR UNION HISTORY AND ADMINISTRATION.* Spring term.

651. *THEORIES OF INDUSTRIAL AND LABOR RELATIONS.* Fall and spring terms.

660, 661. *PERSONNEL ADMINISTRATION.* Fall and spring terms, respectively.

670. *COMPARATIVE PROTECTIVE LABOR LEGISLATION.* Spring term.

671. *CURRENT ISSUES IN SOCIAL SECURITY.* Fall term.

LAW 43 (offered by the Law School). *LABOR LAW I.* Fall term.

699. *SPECIAL STUDIES.* Directed research in special problems.

LAW

Professors R. S. STEVENS, L. P. WILSON, G. J. THOMPSON, H. E. WHITESIDE, W. H. FARNHAM, J. W. MACDONALD, A. J. KEEFFE, SHERMAN PEER, H. A. FREEMAN, ARTHUR LARSON, B. F. WILLCOX, L. W. MORSE; *Associate Professors* R. B. SCHLESINGER and W. H. SHANNON; *Assistant Professors* W. D. CURTISS and E. N. WARREN.

All members of the Law Faculty are expected to be in residence during the academic year 1951–52.

The Division of Law consists of members of the Faculty of Law, representatives of the Departments of Economics, Government, History, and Philosophy in the College of Arts and Sciences, the School of Business and Public Administration, and the School of Industrial and Labor Relations, and of such other members of the Graduate School Faculty as for the time being are serving on the special committees of candidates for such degrees.

Master of Laws, LL.M. The degree of LL.M. is intended primarily for those who desire to increase their knowledge of the law by work in special fields. In addition to meeting the general requirements of admission to the Graduate School as stated above, p. 8, the candidate must have received the degree of Bachelor of Laws from an approved law school (or have done work equivalent to that required for such a degree) and must have shown a high level of professional ability. To complete the requirements for the degree the candidate (1) must work for a minimum period of two terms under the direction of a Special Committee of three or more, chosen by the candidate, after consultation with the chairman of the Division of Law, from the Faculty in law and related fields (such as economics, government, history, business and public administration, industrial and labor relations, and philosophy); (2) shall complete with high merit such a program of instruction and investigation as shall be approved by his Special Committee and be acceptable to the Division; (3) must demonstrate his ability creditably to pursue research in law by the submission of articles or reports; and (4) must pass with superior standing a final examination and such other examinations as shall be required by his Special Committee and be acceptable to the Division. For further information see the *Announcement of the Law School.*

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Jurisprudence 1, 2, 3, 4
Legal History 1, 2, 3, 4
Private Law 1, 2, 3, 4
Procedure 1, 2, 3, 4
Public Law 1, 2, 3, 4

Graduate work in law is organized under the direction of the Division of Law of the Graduate School, in which is vested authority to establish and administer rules for the admission to candidacy for, and graduation with, the degrees LL.M. and J.S.D.

This method of organizing graduate work in law is considered especially advantageous since it offers to graduate students in law an opportunity to correlate their work in law with work in allied fields in other departments of the University.

Candidates for the LL.M. or J.S.D. degree are accepted only when the applicant shows unusual qualifications.

Candidates for either of the graduate degrees in law must be in residence no less than one academic year.

The Master's degree is intended primarily for those who desire to increase their knowledge of the law by intensive work in special fields.

Work leading to the Doctor's degree is designed to train legal scholars and to stimulate original investigation in the purpose, administration, history, and progress of the law. It is expected that candidates for the Doctor's degree shall have had some professional practice or teaching experience after obtaining a first degree in law.

As each candidate for a graduate degree in law is admitted and his program arranged on an individual basis, no courses, except jurisprudence, are prescribed for all. The content of the program of any particular candidate will depend upon his individual needs. A description of the course in jurisprudence will be found in the *Announcement of the Law School.*

VETERINARY MEDICINE

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 43)

Animal Pathology 1, 2, 3, 4
Animal Physiology 1, 2, 3, 4
Diseases of Large Animals 1, 2, 3, 4
Diseases of Small Animals 1, 2, 3, 4
Immunology 1, 2, 3, 4
Pathogenic Bacteriology 1, 2, 3, 4
Pharmacology 1, 2, 3, 4
Poultry Diseases 1, 2, 3, 4
Veterinary Anatomy 1, 2, 3, 4
Veterinary Obstetrics 1, 2, 3, 4
Veterinary Parasitology 1, 2, 3, 4
Veterinary Surgery 1, 2, 3, 4

ANIMAL BREEDING, HUSBANDRY, NUTRITION

(See Animal Sciences, above)

VETERINARY ANATOMY

Professor MALCOLM E. MILLER; *Associate Professor* ROBERT E. HABEL; *Assistant Professor* HOWARD E. EVANS.

The personnel of the Department is adequate to provide instruction in any branch of anatomy pertaining to the common domestic species.

The equipment and space in the Department are adequate for work on the large herbivores. Dissections and models of many of the regions and systems of the cow, dog, and horse are available for study. Reference reading material can be found in the Flower Library. Students who plan to do their major work in anatomy will be expected to be undergraduate majors in comparative anatomy or to be graduate veterinarians. Candidates for advanced degrees taking minor work in the Department will be assigned a project or in certain cases will take course work.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the New York State Veterinary College,* Department of Anatomy, Courses 1, 2, 3 and 4. Preregistration is not required.

In certain instances Courses 211 and 212 (Comparative Anatomy) will be accepted in place of the courses in anatomy.

6. *ADVANCED ANATOMY.* Fall and spring terms. Credits to be arranged. Prerequisites, Courses 1, 2, 3, and 4 or Comparative Anatomy 211 and 212 or their equivalents. Professor M. E. MILLER, Associate Professor R. E. HABEL, Assistant Professor H. E. EVANS. Preregistration not required.

9. *ANATOMY OF FARM ANIMALS.* Fall term. Credit three hours. Permission to register required of undergraduates. Professor M. E. MILLER, Associate Professor R. E. HABEL. Not given in 1952–53. Laboratory hours M W F 10–12:30.

PHYSIOLOGY

Professors H. H. DUKES, J. A. DYE, R. W. DOUGHERTY; *Associate Professor* CAROLYN F. SPRAGUE.

The laboratories of the department are well equipped for research work in physiology. Adequate facilities are available for work in both the experimental

and the chemical fields. The Flower Library in James Law Hall provides a good collection of periodicals and books on physiology and related subjects. These may be supplemented by the many works on physiology in other libraries of the University.

Graduate students who plan to do their major work in physiology must have had the basic courses of the Department or their equivalents. Graduate students who plan to do minor work in physiology may take the regularly scheduled courses of the Department, or they may work on a special problem if they are qualified.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the New York State Veterinary College,* Department of Physiology, Courses 303, 10, 11, 12, 13, 14. For Courses 11 and 14, permission to register is required.

16. *ADVANCED EXPERIMENTAL PHYSIOLOGY.* Spring term. Credit three hours. Prerequisites, Physiology 12 or 13, or its equivalent, and Physiology 14, or its equivalent. Professors DUKES, DYE, and DOUGHERTY. Laboratory, F 9–1. A conference hour to be arranged. Permission to register required.

305. *ENDOCRINOLOGY AND METABOLISM.* Fall term. Credit three hours. Prerequisite, six or more hours each of biology and chemistry. Professor DYE. M W F 8.

18. *RESEARCH.* Throughout the year. Professors DUKES, DYE, DOUGHERTY, and SPRAGUE.

ANIMAL PATHOLOGY, PARASITOLOGY, BACTERIOLOGY, VIROLOGY, AND IMMUNOLOGY

(See also Bacteriology, above)

Professors PETER OLAFSON, W. A. HAGAN, H. L. GILMAN, P. P. LEVINE, D. W. BAKER, J. A. BAKER, D. W. BRUNER; *Associate Professors* J. H. WHITLOCK, E. N. MOORE, C. G. RICKARD, KENNETH MCENTEE, J. M. GILLESPIE; *Assistant Professor* JULIUS FABRICANT.

The laboratories of pathology, bacteriology, and parasitology are well equipped with apparatus for research in pathological anatomy, pathogenic bacteriology, and parasitology. The Department operates two diagnostic laboratories to which a great deal of pathological material comes. A variety of fresh material is thus made available for study. The Flower Library in James Law Hall has a complete set of current periodicals, and the more important books and monographs dealing with the work of the Department are available.

Candidates for advanced degrees electing pathology, bacteriology, or parasitology as their major subject must have had at least the corresponding general subjects given in this Department or their equivalents. Candidates electing a minor subject in this Department may take up a research problem if they possess sufficient preliminary training or may pursue regular undergraduate course work, the courses taken being subject to the approval of the staff member who is in charge of the minor.

The following courses are open to graduate students: 40, 40a, 41, 41a, 42, 46, 48, 62, 62a, 63, 64, 152 153, 154. For additional information, see the *Announcement of the New York State Veterinary College.*

VETERINARY THERAPEUTICS AND DISEASES OF SMALL ANIMALS

Professors E. P. LEONARD, H. C. STEPHENSON.

The laboratories of the Department are well equipped for research in veterinary therapeutics and pharmacology. The clinic supplies abundant material for research both in external and internal diseases of small animals.

There is an operating room with modern equipment and facilities for handling approximately one hundred animals. The library facilities are good.

20. *THERAPEUTICS AND PHARMACY.* Spring term. Six hours.

22. *DISEASES OF SMALL ANIMALS.* Fall term. Three hours. M W F 9. Professor STEPHENSON.

22a. *DISEASES OF SMALL ANIMALS.* Fall term. Three hours. M W F 8. Professor LEONARD.

23. *ADVANCED WORK.* This course will consist principally of the study of the action of drugs upon well and sick animals, and of the diseases of small animals. This will be supplemented by collateral readings and reports.

24. *SMALL ANIMAL CLINIC.* Six actual hours a week.

VETERINARY MEDICINE, AMBULATORY CLINIC, AND OBSTETRICS INCLUDING DISEASES OF THE GENITAL ORGANS

Professors M. G. FINCHER, J. M. MURPHY, S. J. ROBERTS; *Associate Professor* F. H. FOX.

Opportunity for the clinical study of internal diseases of animals is afforded by material in the ambulatory clinic. This clinic has gradually developed until it demands a large part of the time of three clinicians. Especially abundant are opportunities to study infections of dairy animals. Students are required to report their observations. Files of notes on completed cases are available for additional information. Special and research students will be given individual instruction to meet their requirements and may supplement their clinical experience with further study in the various laboratories of the College.

The following courses are open to graduate students: 50, 51, 52. For additional information, see the *Announcement of the New York State Veterinary College.*

VETERINARY SURGERY

Professors A. G. DANKS, A. M. MILLS.

The laboratory in surgery is well equipped for research and special study along surgical lines especially in connection with diseases of bones, tendons, and tendon sheaths.

Candidates for advanced degrees should have as preliminary preparation general pathology, physiology, general and special surgery.

32. *SPECIAL SURGERY.* Spring term. Five hours. Professor MILLS.

RESEARCH IN SURGICAL DISEASES. Professor A. G. DANKS.

THE MEDICAL SCIENCES

AS PRESENTED IN THE MEDICAL COLLEGE IN NEW YORK CITY

The Graduate Faculty of the Medical College (Group F of the Graduate School) at present consists of professors in the preclinical branches of medicine who accept properly qualified students as candidates for the higher academic degrees. The qualifications required of graduate students are in every particular those which are required of students in other divisions of the University. Students desiring to enter the Graduate School for work in the medical sciences must direct their applications to: Chairman of Group F, the Graduate School, Cornell University Medical College, 1300 York Avenue, New York 21, N.Y. Professor C. V. Morrill, the present chairman, may be consulted at any time for further information. Because of limitations in space, only a few students can be accommodated in each department. A personal interview is required of all applicants *before the filing of forms*. For a description of the work in the Medical College in New York City, see the *Announcement of the Medical College*.

The Medical College in New York City occupies a portion of the plant of the New York Hospital-Cornell Medical College Association. This medical center is located on the bank of the East River and occupies several city blocks extending from the East River on the east to York Avenue on the west, and from 68th Street on the south to 71st Street on the north. The Medical College group consists of buildings in the western part of the plant, facing York Avenue, opposite 69th Street.

ANATOMY

Professors J. C. Hinsey, C. V. Morrill, G. N. Papanicolaou, W. A. Geohegan, J. MacLeod, C. Berry.

Abundant material and sufficient apparatus are available for advanced study and work in the various branches of anatomy: embryology, histology, descriptive and experimental anatomy, neurohistology, and experimental neurology. Students desiring to pursue graduate work in any of these branches must have had in their college courses preliminary training in general zoology and comparative anatomy. A reading knowledge of German and French is essential.

The courses offered for the medical students appear in the *Announcement of the Medical College* and are particularly recommended to those students who have not pursued work of this kind. In addition, the members of the staff offer work in the various phases of anatomy in which they are especially engaged. Technical and practical anatomical work is fully provided.

The requirements for either a major or a minor in anatomy will be determined for each individual case by the Department of Anatomy after consultation with the authorized representative of the other departments involved. As a prerequisite for graduate work in anatomy, each student will be expected to have a thorough training in the fundamental sciences of physics, chemistry, and biology such as is required for admission to the Medical College.

BACTERIOLOGY AND IMMUNOLOGY

Professors James M. Neill, John Y. Sugg, and Edward J. Hehre.

Facilities are available for advanced study and investigation over a broad range in the general field of microbiology and immunology, including subjects directly

related to the etiology, epidemiology, and pathogenesis of infectious disease, and also aspects of fundamental importance whose practical application may not be immediately apparent. A graduate student may elect investigations in any of the various aspects, but the opportunities are best for students who direct their major interest toward some aspect related to the fields of current investigation of the department. These fields at present include the synthesis of polysaccharides by microorganisms and by enzymes derived from them, and the serological properties of the polysaccharide products; variations in antigenicity and in pathogenicity of influenza viruses and phenomena connected with the cultivation of mixtures of different strains; and immunological aspects of fungi and of mycotic infections.

Prospective majors in the Department should have had several college courses in chemistry, physics, and biology; although, as a rule, considerably more training in chemistry is expected than is needed to meet the minimum requirements for entrance to medical college, unusual training or experience in any one of the sciences will be taken into account in the consideration of candidates who may have had less than the usual training in others.

BIOCHEMISTRY

Professors V. DU VIGNEAUD, D. B. MELVILLE, J. R. RACHELLE, R. W. BONSNES, G. B. BROWN, J. G. PIERCE.

Opportunity is offered for advanced work and research in various phases of biochemistry. Adequate chemical and physical equipment and fundamental library facilities are provided for the investigation of a considerable variety of problems in the chemistry of the plant or the animal organism or of the human organism in health and disease.

Graduate students expecting to pursue investigations in biochemistry should have adequate preliminary training in inorganic, organic, analytical, and physical chemistry.

Students electing biochemistry as a minor subject are expected to complete the regular medical course in biochemistry, or its equivalent, as a minimum requirement.

PATHOLOGY

Professors JOHN G. KIDD, JOHN M. PEARCE, AARON KELLNER, CHARLES T. OLCOTT, JOHN T. ELLIS, and STEPHEN VOGEL.

The departmental laboratories are suitably equipped for carrying on graduate study and research problems in pathology. Since members of the staff are engaged in varied investigations concerning etiology and pathogenesis, the Department offers wide opportunity for the experimental study of disease. Adequate facilities for the care of animals are available. There is a small departmental library where some of the current journals and reference books are kept on file. The main library is situated on the floor immediately beneath the Department and is readily accessible. There is a carefully selected collection of mounted museum specimens, in addition to an active file of preserved gross material for study. The histological collection is likewise rich in material. Autopsies for the entire hospital are performed by the members of the Department and offer an opportunity for the study of fresh pathological tissues.

No regular course of study is offered by the Department for graduate students, but applicants in this field are given abundant opportunity for special work

under the direct supervision of members of the Department. Such work may include the investigation of some problem and may be credited toward the applicant's graduate degree.

PHARMACOLOGY

Professors McKeen Cattell, Harry Gold, Oscar Bodansky, Walter F. Riker, Jr., Frederick S. Philips; *Drs.* Charles J. Kensler, W. C. Wescoe.

Facilities are available for advanced work and research in both the chemical and pharmacodynamic aspects of pharmacology. Special opportunities are offered for work in the pharmacology of muscle-nerve, enzyme systems, the circulation, the autonomic nerves, and toxicology. The Department is well equipped with special apparatus, including cathode ray oscillographs, Warburg apparatus, electrocardiographs with amplifying system, and galvanometers with accessories for the measurement of small temperature changes such as are employed for the measurement of heat production in tissues.

Arrangements will be made for individuals or groups to participate in original investigations in ward patients and in ambulatory patients of the clinics. There are special opportunities for work on digitalis, the mercurial diuretics, cinchona alkaloids, and other problems related to the pharmacology of cardiovascular disorders.

An adequate preliminary training in chemistry and physiology is prerequisite for graduate work in pharmacology.

PHYSIOLOGY AND BIOPHYSICS

Professors Robert F. Pitts, James D. Hardy, ——, ——.

Graduate and research training is provided for students who wish to prepare themselves for teaching and research in the physiological aspects of biological science, with special emphasis on the physical and chemical approach; those who desire to prepare themselves more adequately for clinical practice and research by advanced training in some phase of physiology; and those who are entering a career in human biology.

Instruction is at first provided through the medium of formal basic courses in this and other departments of the Medical College and in the departments of physics and chemistry of neighboring universities. This work is paralleled by similar courses which deal with specialized subjects on a more advanced level. Finally, the student is associated with various members of the staff on a tutorial basis for instruction in special research problems.

PUBLIC HEALTH AND PREVENTIVE MEDICINE
PARASITOLOGY

Professors Wilson G. Smillie, Morton C. Kahn.

In this Department candidates for the Ph.D. degree may elect parasitology as a major subject. Members of this department have all carried on investigations in tropical countries, and an excellent collection of living and preserved parasitic material is available for study and research.

The Medical College courses in both public health and parasitology are acceptable as minor requirements for students who may desire to major in other departments of the University. The Department welcomes graduate students who

wish to register in special fields. Each application will be considered on its merits, and the work may be arranged in accordance with the desires and purposes of the candidate after consultation with the members of the Department.

The laboratories are well equipped for research in public health, epidemiology, serology, and parasitology. Facilities at the Kips Bay-Yorkville District Health Center are available to a limited number of graduate students for the study of certain social aspects of preventive medicine and public health.

It is preferred that the candidate for advanced work in public health and preventive medicine should have a medical degree; he should also possess credit for or the equivalent of the basic course in public health given to the third-year medical students in Cornell. The Department of Public Health and Preventive Medicine does not offer formal graduate courses in public health or in preventive medicine, and the University does not grant advanced degrees in public health.

FELLOWS AND GRADUATE SCHOLARS IN 1950–51

RESIDENT DOCTORS

Dominick Garance, Ph.D., University of Paris, 1946.

Sheelvati Misra, Ph.D., University of Alahabad, India, 1948.

Walter Mosimann, Ph.D., University of Bern, Switzerland, 1934.

Jesus Nicolas, Ph.D., University of Madrid, 1949.

Leonard Singer, Ph.D., University of Chicago, 1950.

Darcy Walker, Ph.D., University of Birmingham, 1948.

Luitpold Wallach, Ph.D., University of Tuebingen, Germany, 1932; Cornell University, 1947.

Harold Wentworth, Ph.D., Cornell University, 1934.

HONORARY FELLOWS

Douglas Blood, B.V.Sc., University of Sydney, 1942.

U. Ko Lay, M.S. in Agr., University of London, 1939.

Charles Mertens, M.D., Louvain University, Belgium, 1948.

Andre Myburgh, B.Sc., M.Sc., University of Stellenbosch, South Africa, 1942, 1943.

ENDOWED AND UNIVERSITY FELLOWS

The Allen Seymour Olmstead Fellowships: Richard A. Ryan, A.B., M.S., Cornell, 1948, 1949. Kenneth G. Buthlay, M.A., Aberdeen, Scotland, 1949.

The Anna Cora Smith Fellowship in Home Economics: Ruth Helen Cook, B.A., University of Toronto, 1935.

The Charles Bull Earle Memorial Fellowships in Mechanical and Electrical Engineering: Chao-Kong Chow, B.E.E., Cornell, 1950. Arthur Leon Kaufman, B.E.E., Rensselaer Polytechnic Institute, 1950. Robert Clarence Rustay, B.E.E., Cornell, 1950.

The Clinton DeWitt Smith Fellowship in Agriculture: Burton C. Matthews, B.S.A., Ontario Agricultural College, 1947; A.M., University of Missouri, 1948.

The Cornell Fellowship in English: Dimmes Anne McDowell, B.A., B.S., University of Minnesota, 1941, 1942; A.M., Radcliffe College, 1944.

The Edgar J. Meyer Memorial Fellowships in Engineering Research: Claude Alain Letort. Sung-Yuen Wong, B.S. (E.E.), Chiao Tung University, 1945; M.S. in Eng., Cornell, 1948.

The Edgar J. Meyer Memorial Fellowship in Mechanical and Electrical Engineering: Roger E. Thayer, B.E.E., Cornell, 1949.

The Erastus Brooks Fellowship in Mathematics: Daniel Burrill, A.B., Harvard University, 1949.

The Fellowship in American History: Freeman W. Meyer, B.A., University of Kansas, 1942; M.A., University of Connecticut, 1950.

The Fellowship in Political Economy: Marvin E. Goodstein, B.S., New York University, 1950.

The George C. Boldt Fellowships in History: Franklin Johnson Pegues, B.S., Duke University, 1947; M.A., Cornell, 1948. James Morton Smith, B.Ed., Southern Illinois University, 1941; M.A., University of Oklahoma, 1946.

The Glasgow Exchange Fellowship: Wayne Lyle Fry, B.S., University of Minnesota, 1947.

The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography: Stanley Holmes, B.Sc., McGill University, 1949.

The Henry Strong Denison Fellowships in Agriculture: Janice Sandford, A.B., Syracuse University, 1949. Rex L. Hurst, B.S., M.S., Utah State Agricultural College, 1948, 1950. Edward M. Wood, B.S., Oregon State College, 1949.

The John Wallace Dallenbach Fellowship in Psychology: Arthur Harriman, B.A., Bucknell University, 1948.

The Martin Sampson Teaching Fellowship in English: Doris V. Falk, A.B., M.A., University of Georgia, 1941, 1942.

The McGraw Fellowship in Civil Engineering: Juan Escarda, B.S.C.E., Silliman University, 1949.

The President White Fellowships in Modern History: Daniel Balmuth, B.S.S., City College of New York, 1950. Robert Bruce Carlisle, A.B., Clark University, 1950.

The President White Fellowships in Political and Social Science: Kenneth V. Koeppel, B.A., University of Buffalo, 1950. John Moore, B.A., Colgate University, 1949. Joseph Tanenhaus, A.B., A.M., Cornell, 1947, 1949.

The Sage Fellowship in Chemistry: Charles M. Cook, Jr., B.S., Pennsylvania State College, 1947.

The Sibley Fellowships in Mechanical and Electrical Engineering: Edward Krick, B.S. in Industrial Engineering, Lehigh University, 1950. Eli Reshotko, B.M.E., The Cooper Union, 1950. John Anthony Smith, B.S. in M.E., Massachusetts Institute of Technology, 1950.

The Sigma Xi Fellowship: Shao-Chi Lin, B.S., National Central University, 1946.

The Simon Henry Gage Fellowship in Animal Biology: H. McClure Johnson, B.S., Massachusetts Institute of Technology, 1946; M.S., Cornell, 1949.

The Susan Linn Sage Fellowships in Philosophy: Charles W. Marshall, B.A., University of Arkansas, 1947. Marcus G. Singer, A.B., University of Illinois, 1948. Robert P. Ziff, B.F.A., Cornell, 1949. Konstantin Kolenda, B.A., Rice Institute, 1950.

The Susan Linn Sage Fellowships in Psychology: Marvin Cline, A.B., Dartmouth, 1948.

The University Fellowship in Agriculture: Zlata Dayton, B.S., Cornell, 1950.

The University Fellowship in Architecture, Landscape Architecture, Fine Arts, and Regional Planning: Allen C. Atwell, B.F.A., Cornell, 1949.

The University Fellowship in Germanic Languages: James Maurice Spillane, B.A., Hobart College, 1947.

The University Fellowship in Romance Languages: Ethel B. Nichols, B.A., University of Minnesota, 1942.

SPECIAL TEMPORARY FELLOWSHIPS

Allied Chemical and Dye Fellowship in Chemistry: Karl E. Lemmerman, B.A., Oberlin College, 1947.

Allied Chemical and Dye Fellowship in Entomology and Plant Pathology: Gustave Sibler, B.S., M.S., Rutgers University, 1949, 1950.

Curtiss-Wright Corporation Fellowship in Aeronautical Engineering: M. Baron T. George, B.E., McGill University, 1949; M.Aero.E., Cornell University, 1950.

Du Pont Postgraduate Fellowship in Chemical Engineering: Harry A. Wistrich, Jr., B.Chem.E., Cornell, 1944.

Du Pont Postdoctoral Fellowship in Chemistry: Leonard Singer, Ph.D., University of Chicago, 1950.

Du Pont Postgraduate Fellowship in Chemistry: Henry Aroeste, B.S., City College, 1947.

Eastman Kodak Company Fellowship in Chemical Engineering: Leonard Topper, B.Chem.E., City College of New York, 1948; M.Chem.E., New York University, 1949.

Procter and Gamble Fellowship: Richard W. Mooney, B.S., Tufts College, 1944.

Radio Corporation of America Fellowship: Hamilton Barhydt, B.A., Yale University, 1950.

Republic Aviation Fellowship: James Q. Brantley, Jr., B.E.E., University of Florida, 1949; M.E.E., Cornell University, 1950.

Schering Corporation Fellowship: Ernest Knobil, B.S. in Agr., Cornell University, 1948.

Shell Fellowship in Chemistry: Abraham B. Cohen, A.B., Temple University, 1948.

Shell Fellowship in Plant Science: Carl C. Lowe, B.S., Colorado A. & M. College, 1948; M.S., Cornell University, 1950.

Society of American Florists Fellowship: George Thompson, Jr., B.S., University of Maine, 1947.

Standard Oil Company of Indiana Fellowship: David W. Shubert, B.S. in Chem.E., University of Rochester, 1950.

Standard Oil Company of Ohio Fellowship in Chemistry: Charles E. Erickson, B.S., M.S., University of Michigan, 1942, 1943.

Texas Fellowship in Chemical Engineering: Joseph B. Farrell, B.Chem.E., Notre Dame, 1943; M.Chem.E., M.I.T., 1947.

U.S. Rubber Company Fellowship in Chemistry: George V. Downing, B.A., Haverford College, 1947.

Westinghouse Fellowship in Mechanical Engineering: Ira Garfunkel, B.M.E., New York University, 1950.

SCHOLARS

The Comstock Graduate Scholarships in Entomology: John C. Martin, B.A., Queens University, 1948. Arthur Muka, B.S., University of Massachusetts, 1950.

The Comstock Graduate Scholarship in Nature Study: Lawrence A. Patrie, B.S., Cornell, 1934; M.S., Albany State Teachers College, 1935.

The Eleanor Tatum Long Graduate Scholarships in Geology: Paul W. Richards, B.S., University of Washington, 1940. Donald S. Stone, B.A., Hamilton College, 1950.

The Graduate Scholarships in Animal Biology: Richard B. Fischer, B.S., Queens University, 1942; M.A., Columbia University, 1943. George Ritchie, B.Sc., MacDonald College, 1948.

The Graduate Scholarship in Botany, Geology, or Physical Geography: Shanti Batra, B.A., University of Calcutta, 1940; M.A., University of Calcutta, 1942. Stanley Holmes, B.Sc., McGill University, 1949.

The Graduate Scholarship in Civil Engineering: Arthur Straub, B.S.C.E., Bucknell University, 1944.

The Graduate Scholarships in Greek and Latin: James Halporn, A.B., Columbia University, 1949. James C. Wilson, B.S., Stanford, 1950.

The Phi Kappa Phi Scholarship: Elsie H. Morris, B.S., Cornell, 1950.

The Susan Linn Sage Graduate Scholarship in Psychology: Norma E. Kaake, B.A., University of Toronto, 1948.

TUITION SCHOLARS

Eleanor Anglin, B.S. in Ed., University of Pennsylvania, 1931.

Wilfred Baker, B.S. in Agr., University of Edinburgh, 1949.

Shantilal Bhagat, B.S. (Agr.), University of Bombay, 1945.

Jon Bjornsson, Certificate, State Agricultural College of Iceland, 1944; Certificate, Long Island Agricultural and Technical Institute, 1947.

Marcia J. Bowden, B.A., New York State Teachers College, 1948; A.M., Cornell, 1949.

Nancy L. Callahan, B.S., Syracuse University, 1949.

Wen Han Chang, B.A., Tung-Chi University, 1937; M.S., Syracuse University, 1949.

Hsien Kei Cheng, B.S., Chiao Tung University, 1947.

Mary C. Collins, B.A. in Home Ec., Washington State College, 1948.

Elisabeth Foye, A.B., Barnard College, 1942 (fall term).

James W. Gousseff, B.S., Iowa State College, 1950.

Risto Harma, B. of Political Science, University of Helsinki, 1949.

Ta Liang, B.Eng., National Tsing Hua University, 1937; M.C.E., Cornell, 1948.

Jessie G. Lutz, B.A., Women's College, University of North Carolina, 1946; M.A., University of Chicago, 1948.

William A. Maine, B.S., University of Connecticut, 1949.

Wilfred W. McCutcheon, B.Sc. (Agr.), McGill University, 1942; B.Sc., Sir George Williams College, 1943; B.A., Sir George Williams College, 1944; B.Ed., Acadia University, 1946; M.S. in Agr., University of Toronto, 1948.

Maurice Z. Michelman, B.A., Cornell, 1950.

Kenneth W. Moore, B.M.E., Cornell, 1950.

Rodolfo Moreno-Dahme, Ingeniero Agronomo, Escuela Nacional de Agricultura, 1946; M.S. in Agr., Cornell, 1948 (fall term).

Vivian C. Morter, A.B., Cornell, 1949.

Liang Ju Pan, B.S., National Southwest Associated University, 1943; M.S. in M.E., Virginia Polytechnic Institute, 1949; M.S. in Applied Mechanics, Virginia Polytechnic Institute, 1950.

Rosemily Petrison, B.M.E., Cornell, 1949.

James Root, B.S. in C.E., University of Vermont, 1941.

Gloria A. Saracco, B.A., Cornell, 1950.

Robert L. Schneider, B.A., University of Colorado, 1950.

Harry D. Semonin, B.F.A., Cornell, 1950.

Rudra Singh, M.A.; Muslim University, 1936; B.T., St. Edmunds College, 1937; M.A., University of Lucknow, 1939; Ed.M., Harvard University, 1947.

Jose Vargas, B.A., Furman University, 1945; A.M., Cornell, 1949.

Betty Sue Young, B.A., Rice Institute, 1944; M.A., University of Toronto, 1949.

Mary V. Zaehringer, B.S., Temple University, 1946; M.S., Cornell, 1948.

INDUSTRIAL AND LABOR RELATIONS TUITION SCHOLARS

Esther Demeo, A.B., Guilford College, 1945.

Robert Reges, B.S. (Mgt.), University of Illinois, 1949.

Gladys Waltcher, B.S., Boston University, 1946.

ROSTER OF DEGREES

ADVANCED DEGREES CONFERRED IN 1949–50

MASTERS OF ARTS

CONFERRED SEPTEMBER 20, 1949

Margaret Louise Allen, B.A., Speech and Drama.

Marcia Jean Bowden, B.A., Social Studies.

Marvin Lester Cohn, B.S. (Soc.Sc.), American History, Constitutional Law. Thesis: The New York Insurance Investigation of 1905.

Janette Collet, Bacc. de Philosophie, French Literature, American Literature. Thesis: Louise Labe et Madame de Noailles.

Joanne Elliott, B.A., Applied Mathematics, Mathematical Analysis. Thesis: The Inversion of a One-sided Hilbert Transform. (As of June, 1949.)

Rita Grace Fanelli, A.B., English Literature.

Lu-I Hsia, B.A., Educational Psychology, Home Economics Education. Thesis: An Ideal Teacher from Chinese Pupils' Viewpoint—A Survey of 409 Pupils in Six Senior High Schools in Shanghai, China.

Doris Eleanor Jones, B.A., Educational Psychology, Psychology (Child Development). Thesis: A Pattern Analysis of Schizo phrenico on the Wechsler-Bellevue Scale.

Louise Kingman, B.S. in Ed., Speech and Drama.

Arthur Washington Lithgow, A.B., Playwriting, American Literature. Thesis: The Playwright and the Modern Theatre.

Richard Eastman Madtes, B.A., The English Renaissance to 1660, The Restoration and the Eighteenth Century. Thesis: Shakespeare's Use of Prose.

Louis Verdun Marsh, A.B., Dramatic Production, Dramatic Literature. Thesis: An Essay on the Mise en Scène. A Translation of Emile C. V. Perrin's "Etude sur la Mise en Scène"; "Lettre à M. Francisque Sarcey."

Frederick Lee Morgan, B.A., English Literature since 1700, American Literature. Thesis: The Genesis and Development of George Crabbes' Realism.

Harold Ira Nelson, B.A., English History, Modern European History. Thesis: The British Dominions at the Paris Peace Conference, 1919: An Essay on Their Role in the Colonial and in the Racial Equality Negotiations.

Glenn Vinton Russell, A.B., Neurology, Histology and Embryology. Thesis: A Wax-Plate Reconstruction of the Nuclei of the Dorsal Thalamus of *Macacus rhesus*.

Paul Edward Sultan, B.A., Monetary Economics, Economic Theory and Its History. Thesis: The Level of Wages as a Determinant of Full Employment Equilibrium.

Edgar Allyn Thompson, B.A., Speech and Drama.

Jose Emilio Vargas, B.A., Spanish Literature, Spanish Linguistics. Thesis: Algunos aspectos de Galicia en *La Obra* de Valle-Inclan.

Edward Stanley Wajda, B.S. in Physics, Experimental Physics, Mathematics. Thesis: Photoelectric Effects in Germanium Type Transistors.

Bernard Wand, B.A., History of Philosophy, Ethics. Thesis: Bradley's Ethics.

William Horace Whittemore, A.B., English (American Literature).

Eugene Raufer Wood, A.B., English.

Franklin Myles Wright, A.B., Medieval History, Modern European History. Thesis: Henry of Bolingbroke and the Revolution of 1399.

CONFERRED FEBRUARY 1, 1950

Anne Ketcham Blodgett, A.B., Dramatic Production, Dramatic Literature. Thesis: Anna Cora Mowatt.

Lois Jane Conway, B.S. in Ed., Speech and Phonetics, Dramatic Production. Thesis: Methods of Speech Correction for the Cerebral Palsied.

Frederica Anne Edelman, A.B., French Literature, Russian Literature. Thesis: Anomaly and Art in Dostoevski and Gide.

John Sutphen Lawrence, A.B., The English Renaissance to 1660, Latin Literature. Thesis: Aspects of Social Criticism in the Pamphlets of Dekker, Greene, and Nashe.

Victor Lopez, A.B., Spanish Literature, Cultural Anthropology. Thesis: The Influence of Alexandre Dumas Père on Some of the Historical Novels of Spain.

Norbert Rosenzweig, B.S., Theoretical Physics, Mathematics. Thesis: Variational Determination of Atomic Wave-Functions and Energy Levels.

Barbara Charlotte Schrier, B.A., The Nineteenth Century and After, American Literature. Thesis: The Influence of Higher Criticism and Scientific Theory upon the Religious Convictions of Robert Browning.

Jacob Shuel, A.B., Education.

Josephine McConnell Sikes, A.B., Education.

Frederick Doster Stocker, B.A., Public Finance, American Government and Institutions. Thesis: Percentage Depletion of Oil and Gas Properties.

Carl Arthur Streuli, B.S.(Chem.), Analytical Chemistry, Organic Chemistry. Thesis: A Study of the Absorption Spectra of Cobaltic Complexes.

Joseph Richard Suchman, A.B., Education.

CONFERRED JUNE 12, 1950

William Edward Simonds Andrews, A.B., Education.

Harlan Gustav Hans Bartram, B.A., Mathematical Analysis, Applied Mathematics. Thesis: Empirical and Theoretical Distribution Functions.

Frederick Joseph Behrle, A.B., Child Development.

Albert Sydney Bonner, Jr., A.B., Foreign Languages.

Rosemary Ann Brown, A.B., English.

Selma Chernigow, A.B., Literature.

James Madison Coffee, A.B., American History, English History. Thesis: Washington and the French Alliance.

Abraham Cohen, A.B., Musical Composition, Dramatic Production. Thesis: Aria da Capo: A Musical Setting of a Play by Edna St. Vincent Millay.

William Robert DeMougeot, B.A., Rhetoric and Public Speaking, Speech and Phonetics. Thesis: Modern Conceptions of Invention and Disposition.

Anne Sherwood Elliott, A.B., Education.

Eleanor Mildred Elwyn, B.S., Dramatic Literature.

William Exall Felver, Jr., A.B., Latin Literature, Latin Language. Thesis: Divine Machinery in Latin Epic Poetry.

Anthony Geiss, A.B., Creative Writing, The Nineteenth Century and After. Thesis: The Quiet Search.

James Jack Gindin, B.A., The English Renaissance to 1660, The Nineteenth Century and After. Thesis: A Consideration of the "School of Night."

Marion Goddard, B.A., Algebra, Mathematical Analysis. Thesis: Postulate Systems for Boolean Algebra.

Edward Frank Goelz, B.S. in Ed., Social Studies.

Theodore Philip Hammes, A.B., Education.

George Alfred Hazen, A.B., English.

Gussie Hecht, A.B., Latin Language and Literature, Ancient History. Thesis: Bede: *De schematibus et tropis* Rendered into English, with Notes.

William Hanna Hopple, Jr., Education.

Frederic Henry Johnson, A.B., Neurology, Comparative and General Physiology. Thesis: A Histological Study of Axonal Contacts in the Spinal Cord and a Discussion of Their Physiological Significance.

Nicholas John Karateew, B.A., Foreign Languages.

Henry David Kirk, B.S. (Soc. Sci.), Sociology, Anthropology. Thesis: The Loyalties of Men in Crisis: An Exploratory Study of Some Dimensions of Allegiance.

Leopold Joseph Krul, A.B., Latin, Greek. Thesis: The *Forma Praedicandi* of Robert of Basevorn, Abridged and Translated into English.

Barbara Lee, B.A., Fine Arts (Music).

Ted Morell Levine, A.B., Prose Fiction. Creative Writing. Thesis: Not So Careless Love (Romance and Marriage in Popular Magazine Fiction).

Gerhard Loewenberg, A.B., Comparative European Government, Constitutional Law. Thesis: The Sources of the Bonn Constitution.

Anne MacFetridge, B.A., English.

Bonnie Jean Mack, B.S., Home Economics.

Mary Elizabeth McClelland, B.A., Education.

Arthur Smith McDonald, A.B., Latin.

Ray Byron Merriam, A.B., Education.

Barbara Kade Miller, B.A., Foreign Languages.

Marjorie Jean Munro, A.B., Latin.

Martha Lewis Murrell, B.S., Speech and Drama.

Albert Philip Nadler, A.B., Social Studies.

William Albert Oliver, Jr., B.S., Paleontology, Sedimentation. Thesis: Coral Beds of the Middle Devonian (Hamilton) of Central New York.

Harry Oster, A.B., M.B.A., American Literature, The Nineteenth Century and After. Thesis: Whittier and Folklore.

Theodore Peck, A.B., The English Renaissance to 1660, The Nineteenth Century and After. Thesis: A Study of Marlowe's "Massacre at Paris."

Roland Edward Ransom, A.B., Education.

Susan Redman, B.Ed., Speech and Drama.

William Howard Seibel, Jr., B.A., English.

Virginia Mae Shoemaker, B.A., Algebra, Geometry. Thesis: For What N Does a Finite Projective Plane Geometry Exist with N + 1 Points on a Line?

Lucille Ann Silverberg, A.B., Social Studies.

Herbert Leigh Smith, A.B., Dramatic Production, Theatre Techniques. Thesis: The Theatre of the Future (Le théâtre de l'avenir) by Georges Vitoux. (Degree conferred as of February, 1950.)

Doreen Ethel Ray Steg, B.A., French Literature, Russian Literature. Thesis: A Study of Madame de La Fayette.

Herbert Stiles, B.A., Creative Writing, The Restoration and the Eighteenth Century. Thesis: Where None Can Intrude.

Donald Matthews Terry, A.B., Economics.

Neil Kennedy Van Allen, B.A., Literature.

Roger Carleton Van Tassel, B.A., Economic Theory and Its History, Political Theory. Thesis: Some Aspects of the Rigid Price Problem.

David Hinkley Williams, A.B., Linguistics.

Charles Levi Wood, III, A.B., Applied Psychology, Experimental Psychology. Thesis: Rate of Blinking as a Correlate of Effort and Performance.

MASTERS OF SCIENCE

CONFERRED SEPTEMBER 20, 1949

Andrew Wilfred Ashby, B.Sc., Marketing, Land Economics and Agricultural Geography. Thesis: Milk Prices and Their Effect on the Seasonal Variation of Farm Sales of Milk.

Perley Fernando Ayer, B.S., Education.

Pier Luigi Bargellini, Doctor in Industrial Engineering, Radio and Communication Engineering.

Phyllis Janet Berger, B.S. in Ed., Textiles and Clothing.

William John Bourne, B.S. in Agr., Agricultural Engineering, Farm Equipment. Thesis: Recent Developments in Hay and Forage Handling.

Albert Loren Brown, B.S. in Agr., Bacteriology, Genetics. Thesis: The Nucleases of Streptococci.

Gladys Gelbach Brown, B.S. in H.E., Home Economics.

Barbara Virginia Bruen, B.S., Home Economics.

George Albert Buck, B.Ed., Education (Nature Study).

Eileen Barbara Burke, A.B., Plant Pathology, Plant Physiology. Thesis: Studies on Three Septorias Causing Leaf-Spot Diseases of Chrysanthemums.

Anna Elizabeth Cardwell, B.S., Biological Sciences.

Mary McCray Chambers, A.B., Biological Sciences.

Rupert Edward Clark, B.S. in Agr., Technical Agriculture.

Arthur Robert Collier, B.A., Animal Physiology, Endocrinology. Thesis: Utilization and Significance of the Lower Fatty Acids in the Metabolism of the Sheep.

Doris Lorraine Cox, B.S., Home Economics.

Joan Day, B.S., Rural Sociology, Rural Education. Thesis: Levels of Living and Supervisors' Ratings of New York Families on the Rural Rehabilitation Program in 1942.

Winifred Mae Eakin, B.S. in Educ., Home Economics.

Mary Caroline Egan, B.S., Foods and Nutrition, Home Economics Education. Thesis: An Investigation of the Use of a Questionnaire in Ascertaining the Alleged Food Preparation Practices of Homemakers and the Implications of the Information Obtained for Program Planning for Adult Groups.

William Benford Farrington, B.C.E., Structural Geology, Economic Geology. Thesis: Depth of Burial, the Major Cause of Changes in Carbon Ratio in West Virginia.

Youssef Salah Eldin Ghanem, B.Vet.Med., Psychobiology, Comparative Neurology. Thesis: Conditioned Inhibition and Higher-Order Conditioning in Sheep and Goats.

Charles Katz, B.S. in Chem. Eng., Physical Chemistry, Organic Chemistry. Thesis: The Heat of Combustion of Boron.

Wayne Franklin Keim, B.Sc. in Agr., Plant Breeding, Cytology. Thesis: Studies on the Chemical Induction of Mutations in *Neurospora crassa.*

John Gerard Kleyn, B.S., Bacteriology.

Yuen-liang Ku, B.S., Plant Breeding, Plant Pathology. Thesis: Methods of Developing Desirable Germplasm in Cotton.

Helen Lancaster, B.S., Foods, Nutrition. Thesis: Some Effects on Baked Custards of Varying the Temperature of the Milk Which Is Incorporated.

Mary Elizabeth Lush, B.S., Food and Nutrition, Nutrition. Thesis: The Effect of Thawing and Cooking Methods, Conventional and Dielectric, on Weight Loss, Drip, Expressible Juice, Palatability and Time Required to Cook Frozen Ground Meat.

Katharine Elizabeth Manchester, B.S., Home Economics.

Martha Jane Clark Mapes, B.S., Home Economics.

Carlos Manuel Matos, B.S. in Agr., Business Management, Rural Sociology. Thesis: An Analysis of a Government Sponsored Cooperative Project in Puerto Rico.

Jean McCaskill, B.S., Plant Physiology, Plant Anatomy. Thesis: Studies on the Influence of Bordeaux Sprays on Transpiration.

Antonio Mercado, Ing. Agron., Vegetable Crops, Plant Breeding. Thesis: A Study of the Possibilities of Using Pelleted Lettuce Seed for Field Plantings on Muck Soils.

Norma Helen Newman, B.S. (in H.E.), Home Economics.

Dorothy Ellen Peck, B.S., Foods, Nutrition. Thesis: Some Factors Affecting the Quality of Batters and Cakes Prepared from a High Sugar-Ratio Cake Mix.

Ida Beth Schultz, B.S. in Ed., Education (Nature Study).

George John Schumacher, B.S., Botany, Zoology. Thesis: Plankton of Some Fresh-water Lakes in Northwestern Washington State.

Brawner Casper Smith, B.S., Floriculture and Ornamental Horticulture, Plant Physiology. Thesis: Some Aspects of the Dormancy of the Seeds of *Cotoneaster.*

Warren Robert Stumpe, B.S., Engineering Administration.

Robert Louis Stutz, A.B., Collective Bargaining, Mediation and Arbitration, Human Relations in Industry. Thesis: Collective Bargaining in the Connecticut Brass Mill Industry, 1938–1948.

Edward Everett Terrell, B.A., Plant Taxonomy, Cytology. Thesis: Taxonomic Studies of *Houstonia purpurea* and Related Species.

Yen-Chieh Ting, B.S., Biochemistry, Animal Physiology. Thesis: I. Experiments on Animal Phosphorylase: 1. Preparation of Crystalline Phosphorylase *a* from Blenderized Rabbit Muscle; 2. Conversion of Phosphorylase *a* to Phosphorylase *b* by Tryptase; II. Toxicity of Urease.

Elizabeth Louise Franklin Van Yahres, B.S. in H.Ec., Technical Agriculture.

Elizabeth Boeve Watts, B.S., Home Economics.

Leonard Norman Zimmerman, B.S. in Agr., Bacteriology, Genetics. Thesis: A Factor Involved in the Metabolism of Arginine by *Streptococcus faecalis* R.

CONFERRED FEBRUARY 1, 1950

Franklyn Pierce Cism, Jr., B.S. in Agr., General Science.

Carlos del Río Estrada, Bacteriological Chemist, Bacteriology.

Francis de Vos, B.S., Floriculture and Ornamental Horticulture, Botany. Thesis: Vegetative Keys to the Hardy Broad-Leaved Evergreens.

Bennett Avery Dominick, Jr., B.S. in Agr., Marketing, Land Economics and Agricultural Geography. Thesis: Development and Extent of Canning Operations in the Northeast with Special Reference to New York State.

Elliott Francis Dressner, B.A., B.S.Min.Engr., Economic Geology, Structural Geology. Thesis: Genesis of the Clifton Mine Magnetite Deposit, De Grasse, St. Lawrence County, New York.

Rose Anna George, B.S. (H.Ec.), Home Economics.

Kenneth Goodwin, B.S., Animal Genetics, Histology and Embryology. Thesis: A Genetic and Physiological Study of a Sex-Linked Lethal in the Fowl.

Fathalla Ahmed Saad Halloul, B.S., Rural Sociology.

Edgar Neal Hinrichs, B.A., Mineralogy, Structural Geology. Thesis: The Pegmatites of the Errington-Thiel Mine, Elko County, Nevada.

Austin Arthur Howard, B.S., Algebra, Mathematical Analysis. Thesis: Boolean Algebras, Rings, and Spaces.

Robert Hsi Lin Howe, B.S. in Physics, B.C.E., Experimental Physics, Sanitary Engineering. Thesis: A Comparison of the Hydrogen Ion Gauge Leak Detector and the Diode Leak Detector for Hunting Leaks in a Vacuum System.

Herbert Hubben, A.B., Collective Bargaining, Mediation and Arbitration, Personnel Management. Thesis: Labor Relations Theory: An Analysis of Some Leading Explanations of the Labor Movement in the Light of Modern Experience.

Ray Walter Hurd, B.S. (Hotel), Labor and Industry.

Donal Dabell Johnson, B.S., Technical Agriculture.

Rexford Pryor Kastner, B.S., Collective Bargaining, Mediation and Arbitration, Personnel Management. Thesis: Supervisory Seniority as a Problem in Industrial Relations.

William Russell Kelley, B.S. in Ed., Litt.M., Economic Botany, Zoology. Thesis: Seed Production, Storage, and Germination in Certain Species of Cyperus.

Donald Thomas Laird, B.S., Theoretical Physics, Experimental Physics. Thesis: Nuclear Isomerism: A Critical Study of the Relationship between the Theory and Available Experimental Data.

Albert Groombridge Moat, Jr., B.S. in Agr., Bacteriology, Biochemistry. Thesis: Pantothenic Acid Requirements of *Propionibacterium freudenreichii.*

Archibald Napier, Jr., A.B., Statistics, Sociology. Thesis: Bias in the News.

Jack Cree Rogers, B.A., Mathematics, Physics. Thesis: Generalized Differentiation.

Saul Bernard Saila, B.S. in Agr., Fishery Biology, Soils. Thesis: A Preliminary Survey of Some Farm Fishponds in New York.

Helen Baker Stevens, B.S., Foods, Biochemistry. Thesis: The Retention of Three Vitamins and of Palatability in Commercially Frozen Peas Cooked by Dielectric and Standard Methods. (As of September, 1949.)

Mary Ann Williams, B.S., Biochemistry, Animal Nutrition, Animal Physiology. Thesis: Soft Tissue Calcification in Guinea Pigs on Certain Diets.

CONFERRED JUNE 12, 1950

Sylvan Alcabes, A.B., Botanical Science.

Frank David Anderson, B.A., Anatomy, Neuroanatomy. Thesis: A Further Modification of the Protargol Technique Utilizing Fast Green for the Suppression of Connective Tissue.

Dorothy Ann Arata, B.S., Nutrition, Biochemistry. Thesis: The Effect of Supplements to Commercial Bread on the Growth Rate of the Rat. I. Yeast and Amino Acid Supplements to Commercial Bread II. Patent Flour vs. Vitafed Flour in a Milk-Soy Type Bread with Special Emphasis on the Effect of Rancidity.

John King Backus, A.B., Physical Chemistry, Physics. Thesis: A Study of the Colbaltous Complex Ion of Ethylene Diamine Tetra Acetic Acid.

William Gloor Bentley, B.S. in Agr., Fishery Biology, Ichthyology. Thesis: Initial Study on the Recovery and Relative Survival of Fingerling and Yearling Lake Trout Stocked in Cayuga Lake.

Charles Spencer Benz, B.S., Physical Chemistry, Physics. Thesis: The Direct Measurement of the Intensity of X-rays Scattered at Low Angles.

Katharine Frizzell Blaisdell, B.S., Veterinary Parasitology, Animal Physiology. Thesis: A Study of the Biology of the Cat Lungworm, *Aelurostrongylus abstrusus* (Railliet, 1898) Cameron, 1927.

Sister Joseph Mary Boylan, O.S.U., B.S., Home Economics.

Peter Paul Alexander Burnett, B.A., Soil Mechanics, Physical Chemistry. Thesis: The Effect of Ion Exchange and Zeta-Potential on the Permeability of Clays to Flow of Water.

Agnes Marian Carlson, B.S., Home Economics.

Daniel Paul Caylor, Jr., B.S. in Ed., Zoological Science.

Roland Charles Clement, B.A., Conservation.

William Gregory Cooper, B.S., Anatomy, Biochemistry. Thesis: A Consideration of the Human Ductus Arteriosus with Special Reference to the Distribution of Elastic Tissue.

Verda Mae Dale, B.S. in H.E., Home Economics.

Kendall Thomson Dempster, B.S., Biological Sciences.

Nicholas Drahos, B.S., Education.

Rachel (Bérubé) Dubé, B.S. in H.Ec., Home Economics.

Alice Elizabeth Featherstone, B.S., Institution Management, Food. Thesis: Some Factors Affecting the Quality of Fruit Pie Fillings Prepared in Quantity.

George Russell Free, B.S. in E.E., Soils, Agricultural Engineering. Thesis: Storm Direction and Certain Related Physical Characteristics of Soil.

Gerhard Frederick Gettel, B.S., Rural Sociology.

Peter Frank Gundelfinger, B.E.E., Industrial Engineering, Industrial Education. Thesis: Packaging Engineering.

Patricia Osborne Jackson Hathaway, B.S. (H.Ec.), Home Economics. (Degree conferred as of February, 1950.)

Janet McHugh Hawksley, B.A., General Science.

Orvis Franklin Johndrew, B.S., Agricultural Education, Farm Management. Thesis: The Place of Poultry Marketing in the Teaching of Vocational Agriculture in the Northeastern States.

Ezell Williams Johnson, B.S., Home Economics.

John Charles Jones, A.B., Education.

Arthur Henry Kantner, B.S. in Agr., Marketing, Business Management. Thesis: Poultry Prices on the New York City Market, 1875 to 1950.

Dorothy Mary Klitzke, B.S., Economics of the Household and Household Management, Textiles and Clothing, and Housing and Design. Thesis: An Examination of Series of Quantitative Data Relating to Clothing Consumption of Selected Articles of Outerwear for Men and Women.

Philip George Krueger, B.S., Engineering Physics, Administrative Engineering. Thesis: Soil Density by Gamma Ray Scattering.

William August Kumpf, B.S., Education.

William Lautz, B.S., Plant Pathology, Entomology. Thesis: Relative Resistance of Encysted and Emigrated Larvae of the Golden Nematode *(Heterodera rostochiensis* Wollenweber) to DD Mixture and Hot Water.

Raymond Henry Lickert, B.S. in Agr., Education.

Carl Clifford Lowe, B.S., Plant Breeding, Plant Pathology. Thesis: A Study of Open-Pollinated Seed Set and of Anthesis in Self-sterile Clones of Bromegrass, *Bromus inermis* Leyss.

Peggy Schiffman Marcus, B.S., Home Economics.

Robert Edward Merritt, B.A., Biological Sciences.

James Gregory Miller, D.V.M., Diseases of Large Animals, Animal Breeding. Thesis: A Method of Endometrial Biopsy in the Bovine and the Study of Biopsy Specimens in Cases of Infertility.

Eva Stone Minix, B.S., Education.

Stephen Andrew Moros, B.S. in Chem., Analytical Chemistry, Organic Chemistry. Thesis: Spectrochemical Determination of Minor Constituents of Plant Materials.

Leland Clair Mowrey, B.S. in Ed., Zoological Science.

Pergrouhi Haroutun Najarian, B. A., Educational Psychology, Child Development. Thesis: The Educational Frontier in Lebanon and John Dewey's Philosophy of Education.

Robert LeRoy Newton, B.S., Organic Chemistry, Physical Chemistry. Thesis: Problems on the Synthesis of 6, 7–Unsymmetrically Substituted Pterdines.

George Allan O'Brien, B.Sc. (Agr.), Marketing, Farm Management. Thesis: The Co-operative Marketing of Fleece Wool in Canada.

Hernan Oropeza Perera, B.S., Plant Breeding, Field Crop Production. Thesis: Variation of Self-Fertility in Orchard Grass (*Dactylis glomerata* L.).

Elna Christine Petersen, A.B., Food and Nutrition, Institution Management. Thesis: A Dietary Study of the Nursery School Children at the New York State College of Home Economics.

Marcia Ruth Hutchins Pimentel, B.S., Food, Nutrition. Thesis: The Effect of Mixing Procedures on the Characteristics of Batter and Cakes Prepared from a Home-made Cake Mix.

Jeanne Reynolds Rackow, B.S. (H.E.), Nutrition, Animal Nutrition. Thesis: A Dietary Study of Four Hundred Elderly Patients in a New York State Mental Hospital.

Theodore Dwight Richards, Jr., B.S., Education.

Marion Elizabeth Ruff, B.A., Plant Taxonomy, Painting. Thesis: Methods and Techniques in Botanical Illustration.

Anne Ruth Wicker Sanderson, B.S., Home Economics.

Harry John Scheifele, Jr., B.A., Organic Chemistry, Inorganic Chemistry. Thesis: The Mechanism of Biaryl Formation from N–Nitrosacetanilide, Benzoyl Peroxide and Benzenediazonium Hydroxide with Nitrobenzene.

Dorcas Jane Schoppe, B.S., Housing and Design.

Horacio Soberon, B.S., Agronomy.

Coenraad Helmich Henri ter Kuile, B.S. in Agr., Soils, Plant Breeding. Thesis: The Potassium Supplying Power of Some New York Soils as Determined by Laboratory and Field Tests.

Dionisios Andrew Theokas, B.S. in Agr., Dairy Science, Animal Nutrition. Thesis: Antioxidant Properties of Nordihydroguairetic Acid (NDGA) in Cream Pasteurized 61.7° C. (143° F.) and 65.6° C. (150° F.)

Gale Arleen Ueland, B.S. in H.E., Home Economics.

Joseph Wagner, B.S., Anatomy, Neuroanatomy. Thesis: A Study of the Fructose of Semen.

Philo Calhoun Wilson, B.A., Structural Geology, Paleontology. Thesis: Geology of the Northeastern Part of the Allenville Quadrangle, Pennsylvania.

Martha Josephine Wright, B.S. in H.Ec., Housing and Design, Agricultural Engineering. Thesis: The Influence of Economic Level and Type of Resident on the Housing Situations of Rural Families in Monroe County, New York.

MASTERS OF SCIENCE IN AGRICULTURE

CONFERRED SEPTEMBER 20, 1949

Clifford Alston, B.S., Business Management, Farm Management. Thesis: Federal Policy toward Agricultural Cooperatives.

"A." "J." Ashe, B.S.A., Farm Management, Marketing. Thesis: Input-Output Relationships in Milk Production from New York Cost Account Farms, 1940–47.

Sidney Pearce DuBose, B.S., Floriculture.

Walter Berkley Hinkle, Jr., B.S., Marketing, Prices and Statistics. Thesis: An Economic Study of Fruit and Vegetable Merchandising in Three Retail Food Stores, Syracuse, New York, January 1948 through June 1948.

James Tarlton Lazar, Jr., B.S., Dairy Science.

John Robert Leahy, D.V.M., Veterinary Anatomy, Veterinary Obstetrics. Thesis: Muscles of the Head, Neck, Shoulders, and Forelimb of the Dog with 40 Plates of Original Drawings and 37 Redrawn Illustrations, from Huber. (As of June, 1949.)

Donald Cyril MacKay, B.Sc. (Agr.), Technical Agriculture.

August Donald Pistilli, B.S., Agricultural Engineering, Soils. Thesis: The Design and Construction of the Small Earth Dam.

William John Turner, B.Sc. (Agr.), Agricultural Engineering, Entomology. Thesis: Laboratory Investigations of a Dust Feed-Rate Mechanism.

Jose S. Valle, B.S. in Agr., Vegetable Crops.

Everett Lee Wisman, B.S., Poultry Husbandry.

CONFERRED FEBRUARY 1, 1950

Walter Baran, Jr., B.S., Pomology.

Robert Lee Bickford, Jr., B.S. in Agr., Education.

Gordon Joseph Cummings, B.S., Rural Sociology, Extension Education. Thesis: The Differential Adoption of Recommended Farm Practices among Dairymen in a New York Community.

Robert Eldon Danielson, B.S., Soils, Inorganic Chemistry. Thesis: A Study of the Exchange of Calcium for Hydrogen in Wood Peat by Activity Methods.

Wayne Richard Elliott, B.S. in Agr., Farm Management, Land Economics and Agricultural Geography. Thesis: Farm Management Possibilities for Oil Companies.

Frederick Forrest Fleischman, Jr., B.S. in Agr., Dairy Science, Agricultural Economics. Thesis: A Preliminary Study of the Use of Pyrex Glass Tubing in Dairy Plants.

Floyd Henderson, B.Sc. in Agr., Technical Agriculture.

Hong Bom Kim, Certificate Waseda Univ., Tokyo, Farm Management, Public Administration and Finance. Thesis: An Economic Study of Apple Orchards in the Hudson Valley, New York, 1945–1947.

Charles Kenneth Laurent, B.S. in Agr., Marketing, Farm Management. Thesis: Consumer Purchases of Eggs. Syracuse, New York.

Lyle Engnar Nelson, B.S., Soils, Plant Physiology. Thesis: An Evaluation of a Technique for Studying the Calcium-Potassium Interrelationship in the Plant-Soil System.

CONFERRED JUNE 12, 1950

William David Case, B.S., Technical Agriculture.

Edward Oscar Eaton, B.S. in Agr., Technical Agriculture.

Egerton John Hamilton, D.I.C.T.A., Technical Agriculture.

Irving Errington Johnson, D.I.C.T.A., Technical Agriculture.

Herbert Arthur Leonard, B.S., Technical Agriculture.

Don Charles Nearpass, B.S. in Agr., B.S., Technical Agriculture.

MASTERS OF ARCHITECTURE

CONFERRED SEPTEMBER 20, 1949

Edward Benton Miles, B.S., Architectural Design, City and Regional Planning. Thesis: A Campus Development Plan for the University of New Hampshire, Durham, New Hampshire.

Donald Ripley Peirce, B.Arch., Architectural Construction, Structural Engineering. Thesis: The Designing of Buildings in Concrete.

CONFERRED FEBRUARY 1, 1950

Gordon Edward Johnson, B.Arch., Architectural Construction, Structural Engineering. Thesis: Design of the Reinforced Concrete Structure for an Astronomy Building.

Haragovind K. Mewada, B.Arch., Architectural Design, City Planning. Thesis: Principles of Residential Neighborhood Unit Developments as Applied to Indian Cities.

Lloyd Emerson Albert Orton, Dip.Arch.Design, Architectural Design, Architectural Construction. Thesis: The Design of Industrial Buildings.

MASTERS OF FINE ARTS

CONFERRED JUNE 12, 1950

Victor Elman Colby, A.B., Sculpture, Art History, French Literature. Thesis: Reclining Figure in Carved Mahogany.

John Fornachon Hopkins, B.F.A., Painting, History of Art. Thesis: Presentation of Three Paintings.

Charles Edward Scherneck, B.S., B.F.A., Painting, History of Art. Thesis: Two Casein and Oil Paintings.

Stuart Copeland Van Orden, B.A., Painting, History of Art. Thesis: The Presentation of Eight Easel Paintings.

MASTERS OF REGIONAL PLANNING

CONFERRED SEPTEMBER 20, 1949

Joseph Charles Gardner, Jr., B.C.E., City and Regional Planning, Highway Engineering. Thesis: A Study of Neighborhood Travel Habits in Baltimore, Maryland.

CONFERRED JUNE 12, 1950

Fred Utevsky, B.S. in Soc. Sc., City Planning, Regional Planning. Thesis: A Program for the Redevelopment and Rehabilitation of Slums and Blighted Areas in Binghamton, New York.

MASTERS OF SCIENCE IN ENGINEERING

CONFERRED SEPTEMBER 20, 1949

Neil Lewis Ellis, Jr., B.S., Engineering Physics, Physical Chemistry. Thesis: The Dispersion of the Velocity of Sound in Methyl and Ethyl Acetate.

Alexander John Frolich, B.S., Engineering Physics, Radio Engineering. Thesis: An Investigation of the Transition Times of Beta Brass.

Theodore Eugene Gazda, B.S. in C.E., Structural Engineering, Management Engineering. Thesis: Contributions to a Textbook on Reinforced Concrete.

James Donald Richardson, B.S., Engineering Physics, Mathematics. Thesis: A Device for the Measurement of the Elastic Properties of Metals at High Temperatures.

CONFERRED FEBRUARY 1, 1950

Jack Logan Bellamy, B.S. in E.E., Microwave Engineering, Mathematics. Thesis: Concerning the Determination of the Current Distribution and the Input

Impedance of a Thin Symmetrical, Cylindrical Dipole, from Hallen's Integral Equation by Application of Fourier's Theorem.

Edwin Snow Gallacher, B.S.(M.E.), Mechanics, Heat Power Engineering. Thesis: Theoretical Investigation of a Boundary Layer and Heat Transfer in a Supersonic Nozzle.

CONFERRED JUNE 12, 1950

Russell Wolfe, B.S., Radio and Communication, Mathematics. Thesis: A Noise Generator Using a Coaxial Diode.

MASTERS OF CHEMICAL ENGINEERING

CONFERRED FEBRUARY 1, 1950

Bruce David Hainsworth, B.S. (Ch.Eng.), Chemical Engineering, Industrial Engineering. Thesis: Valve Characteristics in Heat Exchanger Control.

CONFERRED JUNE 12, 1950

Alfred Michael Czikk, B.S., Chemical Engineering, Industrial Engineering. Thesis: Production of Resorcinol by Caustic Fusion.

Horace Thomas Robson, B.S., Chemical Engineering, Industrial Engineering. Thesis: The Condensation of Vapors from Noncondensing Gases.

MASTERS OF CIVIL ENGINEERING

CONFERRED SEPTEMBER 20, 1949

T. Venkataramana Reddy, B.Eng., Geodetic and Topographic Engineering, Highway Engineering. Thesis: Adjustment of a Third Order Triangulation.

Jose Pascual Santoni, B.C.E., Highway Engineering, Soils Mechanics. Thesis: Low Cost Roads for the Dominican Republic.

James Joseph Scott, Jr., B.S. in C.E., Structural Engineering, Management Engineering. Thesis: Design Formulas for Parabolic Arches.

CONFERRED FEBRUARY 1, 1950

Kanok Pranich, B.S. in C.E., Structural Engineering, Hydraulic Engineering. Thesis: Shear Strength of Reinforced Concrete Beams.

CONFERRED JUNE 12, 1950

Milton Edwin Bender, Jr., B.S., Theory of Structures, Soil Mechanics. Thesis: Experimental Verification of Peabody's Theory for Flat Slab Analysis.

David Knox Blythe, B.S. in C.E., Civil Eng., Highway Engineering, Geodetic Engineering. Thesis: Airphoto Interpretation for the Kentucky Highway Engineer.

Dale Eugene Caruthers, B.C.E., Sanitary Engineering, Structural Engineering. Thesis: The Effect of the Addition of Digested Sludge to the Influent of the Plain Sedimentation Method of Sewage Treatment.

Pierre Richon Foss, B.C.E., Soil Mechanics, Theory of Structures. Thesis: A New Method of Direct Shear Testing of Soils.

Ernest George Hackborn, B.S.C., Sanitary Engineering, Structural Engineering. Thesis: An Investigation of the Effect of Dilution on Nitrification in the Determination of Biochemical Oxygen Demand.

William Leonard Hewitt, A.B., B.C.E., Highway Engineering, Soil Mechanics. Thesis: Soil Compaction.

Preston Clark Smith, B.S.C.E., Highway Engineering, Geology and Soil Mechanics. Thesis: Airphoto Interpretation of Soil and Ground Conditions for Part of Proposed Route of Natchez Trace Parkway.

Hsi Hsin Tung, B.S. in C.E., Structural Engineering, Highway Engineering. Thesis: A Preliminary Comparison of Warehouse Designs.

MASTERS OF SCIENCE IN ELECTRICAL ENGINEERING

CONFERRED SEPTEMBER 20, 1949

Ralph Bolgiano, Jr., B.S. in E.E., B.E.E., Radio and Communication, Physics. Thesis: A Low-Noise Design for the R–F and I–F Components of a 3200 Mcs. Receiver.

William Herman Hartwig, B.S. (E.E.), Electrical Measurements and Testing, Astronomy. Thesis: The Design, Construction, and Calibration of a Photoelectric Spectral Photometer.

David Garber Hollister, B.E.E., Radio Engineering, Physics. Thesis: Design of High Frequency Compensation Circuits for Pulse Amplifiers.

CONFERRED FEBRUARY 1, 1950

George Ausenda, B.E.E., Radio Wave Propagation, Physics. Thesis: Investigative Design of Some Sweep Circuits for a High Speed Synchroscope.

Mom Luang Pijit Kambhu, B.S. in E.E., B.S. in M.E., Electric Power Engineering, Hydraulic Engineering. Thesis: Preliminary Design of a Power Plant at Choa Phya River Dam at Chainadh, Thailand.

Te Jen Koo, B.Sc. in E.E., Radio and Communication Engineering, Engineering Physics. Thesis: Transient Response of Linear Networks with Particular Regard to Video Amplifiers.

CONFERRED JUNE 12, 1950

Giorgio Enrico Banfi, Dottore in Ingegneria Industriale (sottosezione Electtrotecnica), Radio and Communication Engineering, Engineering Physics. Thesis: Cross-Talk and Noise in a Two-Channel Time-Multiplex Communication System.

James Quinn Brantley, Jr., B.E.E., Radio Engineering, Mathematics. Thesis: An Automatic Collision Warning System for Aircraft.

E. Robert Scattergood, B.S.E.E., Electric Power System Stability, Electric Power Generation Distribution. Thesis: Effect of a Heat Pump Load Distributed on an Electric Utility System.

Henry James Smith, B.S. in E.E., Servomechanisms, Relaying and Control. Thesis: Principles of Magnetic Amplifiers.

Mark Alan Steinhacker, B.S. in E. E., Electric Power Engineering, Application and Control Engineering. Thesis: An Experimental Analysis of a Phase-Controlled Two-Phase AC Servo System.

Hong Yuan Tsien, B.S., Electric Power Engineering, Application and Control Engineering. Thesis: Study and Design of a Power Transmission Line from Ichang to Chungking China.

MASTERS OF MECHANICAL ENGINEERING

CONFERRED SEPTEMBER 20, 1949

Albert August Emil Bock, B.S. in M.E., Materials of Engineering, Industrial Engineering. Thesis: An Investigation of the Age-Hardening of a High Strength Aluminum Casting Alloy.

John William Feitner, B.S. in M.E., Heat Power Engineering, Industrial Engineering. Thesis: The Design of an Absorption Refrigeration System for Use in Laboratory Instruction.

Samuel Polk Parsons, B.S. in M.E., Heat Power Engineering, Machine Design. Thesis: A Study of Current Test Methods for Aircraft Gas Turbines with a View toward Preparation of a Standardized Test Code to Meet Requirements of Industrial Application and Litigation.

Robert Nelson Rasmus, B.S., Industrial Engineering, Machine Design. Thesis: An Investigation on the Punching of Automotive Chain Links.

Frank Anthony Swingle, B.M.E., Experimental Mechanical Engineering, Materials of Engineering. Thesis: Viscosity Temperature Relationships in Lubricating Oils.

Robert Humphreys Underwood, A.B., B.M.E., Mechanics, Aeronautical Engineering. Thesis: Heat Dissipation from an Annular Fin with Non-Uniform Cross-Section.

Harold Crozier Yost, B.M.E., Experimental Mechanical Engineering (Air Conditioning and Refrigeration), Industrial and Engineering Administration. Thesis: The Design of a Two-Temperature Cold Storage Space.

CONFERRED FEBRUARY 1, 1950

Henry Joseph Gieseler, B.M.E., Materials of Engineering, Heat Power Engineering. Thesis: An Investigation of the Influence of Prior Structure on Some Mechanical Properties of a Sae-Aisi 4140 Steel after Certain Heat Treating Operations.

Adolph Eugene Guenther, Jr., B.S. in M.E., Industrial Engineering, Machine Design. Thesis: Some Aspects of Production Planning and Control.

CONFERRED JUNE 12, 1950

Owen Joseph Black, B.S. in M.E., Materials of Engineering, Automotive Engineering. Thesis: An Investigation of the Correlation between Hardness and Real Tensile Properties.

Chia-Kun Chu, B.S., Heat-Power Engineering, Power Generation. Thesis: Design of a Gas Turbine Unit for Peak Load and Emergency Power Generation.

Harold Lewis Dibble, B.M.E., Mechanics, Mathematics. Thesis: On the Motion of Flexible Cables.

Miguel Antonio Magsaysay, B.S.M.E., Heat-Power Engineering, Administration Engineering. Thesis: The Utilization of Non-Petroleum Fuels for Internal Combustion Engines with Special Emphasis on Coconut Oil as Fuel for Diesel Engines.

Charles Russell Mischke, B.S. in M.E., Heat Power Engineering, Mechanics. Thesis: The Design of a Modern Steam Power Plant.

Richard Magruder Phelan, B.S. in M.E., Machine Design, Heat Power Engineering. Thesis: The Design and Development of a Machine for the Experimental Investigation of Dynamically Loaded Sleeve Bearings.

MASTERS OF EDUCATION

CONFERRED SEPTEMBER 20, 1949

Bruce Keys Beasor, B.S.

CONFERRED JUNE 12, 1950

William Aloysius Gillcrist, A.B.

Bernard Abraham Kaplan, A.B.

Harold Wadsworth Miller, B.S. in Agr.

MASTERS OF SCIENCE IN EDUCATION

CONFERRED SEPTEMBER 20, 1949

Catharine Wheeler Birth, B.S. Thesis: The Development of an Integrated Method of Class Organization for High School Homemaking Classes.

George John Bligh, B.S. in Ed.

Cecil Waddell Boston, B.S.

Earl Victor Boyd, B.S. in Ed.

Alexander Hampton Boykin, B.S.Mech.

David Alfred Cappiello, B.S. in Ed. Thesis: A Comparative Study of the Scholastic Achievement of Selected Groups in the Industrial Arts Department of a Teachers' College.

Evelyn Tina Carlson, A.B.

Roger William Duffany, B.S.

John David Gardiner, B.S.

John Francis Grogan, B.S. in Ed.

John Henle, III, A.B.

Roger Mott Hopkins, B.S.

Thelma Marie Keeler, B. of Ed.

Barbara May Kimball, B.S.

Katherine Alice Knapp, B.Ed.

Enid Spencer Ley, B.A.

James John Miller, B.S. Thesis: Improving Transportation in the Deposit Central School.

Gerald Edwin Ottoson, B.S.E. (C.E.) Thesis: The Utilization of Manpower in the Technical Institutes of New York State.

Sarah LeFrances Wilson Parker, B.S.

H. Marie Pentz, B.S.

Ren-tang Sing, B.S.

Stephen Trembly Stanton, B.S.

Rhoda Tubbs Thomas, B.S. in Ed.

Grace Virginia Virkler, A.B.

CONFERRED FEBRUARY 1, 1950

Bronson Minott Collins, A.B.

Robert Kenneth Fiske, B.S. Thesis: The Status of Graduates of the New York

State School of Industrial and Labor Relations, Involving the Undergraduate Curriculum.

Dorothy Virginia Kane, B.S. in H.Ec.

Samuel Paul Neivert, A.B.

Joseph Albert Schad, Graduate (Oswego Normal). Thesis: Development of a Four Year Industrial Arts Education Curriculum for Virginia Polytechnic Institute.

James Edward Shenton, B.S. in A.E.

Dean Vincent Thompson, A.B. Thesis: A Topical Grouping of the Questions from the New York State Regents Examinations in Physics for 1939–1948.

CONFERRED JUNE 12, 1950

Richard Carlton Dolloff, B.S.

Mary Louise Healy, B.S. (H.Ec.)

Irvin Eugene Henry, B.S. in Ed.

John Walter Keating, B.Ed.

Sarah Wells Kibler, B.S. in Home Ec. Thesis: An Evaluation of Some Administrative Aspects of the Dormitory Social Program at Cornell University.

Georgianna Main, A.B. Thesis: Vocational Publications for College Women: A Study with Particular Consideration for the Needs at Cornell University.

John Howard McCullough, B.S. in Ed.

Daniel John Paolucci, B.S. Thesis: An Appraisal of Mechanical Drawing Courses Offered at Oswego State Teachers College, Oswego, New York.

Herbert Millard Ranney, B.S. in Ed.

Eleanor Alicia Robinson, B.S.

Walter Carl Schroeder, A.B.

George Howard Smith, B.S. in Voc. Ed. Thesis: Tool Design and Its Place in the Field of Education with Special Reference to Certain Areas.

Miriam Alice Terry, B.S. Thesis: A Study of the Value of Certain Tests for the Selection of Personnel in the Ithaca Laundry.

MASTERS OF SCIENCE IN INDUSTRIAL AND LABOR RELATIONS

CONFERRED SEPTEMBER 20, 1949

Andrew Philip Crocchiolo, B.S. in Ed., Industrial and Labor Relations.

Donald Eugene Cullen, B.A., Personnel Management, Collective Bargaining, Mediation and Arbitration. Thesis: The Development of a Foreman's Policy Manual.

Edward Lewis Field, Jr., B.A., L.L.B.

Henry Nathan Mims, B.S. in C. & B.A., Collective Bargaining, Mediation, and Arbitration, Industrial and Labor Legislation and Social Security. Thesis: Impact of Union-Management Relations on Management's Industrial Relations Policy: A Study of the Erwin Cotton Mills Company and the Textile Workers Union of America.

Robert Francis Risley, A.B., Industrial and Labor Legislation, Personnel Management and Social Security. Thesis: Social Insurance in New York State and Its Application to the Problem of Temporary Disability.

CONFERRED FEBRUARY 1, 1950

Alfred Gelberg, B.E.E., Personnel Management, Human Relations in Industry. Thesis: The Structure and Functioning of a Wage Incentive Plan and Its Application to Discontinuous Operations.

Michael Puchek, B.S. in B.A., Personnel Management, Economic and Social Statistics. Thesis: A Survey of the Personnel Policies of a Small General Hospital in New York State.

John Philip Windmuller, A.B., Collective Bargaining, Mediation and Arbitration, Human Relations in Industry. Thesis: Union Organization and Collective Bargaining in Manufacturing and Public Utility Industries in Chemung County, New York.

William Zimmerman, B.S., Personnel Management, Human Relations in Industry. Thesis: A Study of the Personnel Practices and Procedures Affecting Employees in Nonprofessional Positions in the New York State School of Industrial and Labor Relations.

CONFERRED JUNE 12, 1950

Nancy Carol Barone, B.S., Industrial Education, Human Relations in Industry. Thesis: Areas of Managerial Training Needs in Small Retail Stores.

Charles Albert Meyn, A.B., Personnel Management, Industrial Education. Thesis: The Effect of the Region II War Labor Board upon the Probationary Period and Preferential Seniority in Selected Companies.

DOCTOR OF EDUCATION

CONFERRED FEBRUARY 1, 1950

Lloyd Nelson Rahn, B.A., M.A., Educational Psychology, Guidance and Personnel Administration, Applied Psychology. Thesis: An Experimental Study of the Relative Merits of Democratic and Autocratic Methods in the Educative Process.

DOCTORS OF PHILOSOPHY

CONFERRED SEPTEMBER 20, 1949

Rifki Mohamed Anwar, B.Sc., M.S., Soils, Plant Physiology, Biochemistry. Thesis: The Use of Radioactive Phosphorus in Evaluating Some of the Chemical Methods for the Determination of Available Phosphorus in Soils.

Mahmoud Soliman Attia, B.Sc., M.S., Plant Breeding, Plant Pathology, Vegetable Crops. Thesis: Studies of Methods for the Production of Hybrid Cabbage Seed Commercially and Its Use as an Improved Method for Cabbage Breeding.

William Lloyd Barr, B.S., M.S., Farm Management, Agronomy, Marketing. Thesis: Factors Affecting Costs and Seasonality of Milk Production in Pennsylvania, 1945–46.

Lawrence Matthews Bartlett, B.S., M.S., Insect Histology and Morphology, Physiology, Vertebrate Zoology. Thesis: A Histological Study of the Larval Stages of the European Corn Borer.

Donald Eugene Becker, B.S., M.S., Animal Nutrition, Veterinary Physiology, Biochemistry. Thesis: The Physiological Function of Cobalt in Ruminant Nutrition.

Arthur Bing, B.S., Plant Physiology, Floriculture, Plant Breeding. Thesis: The Effects of High Light Intensity and High Temperature on Photosynthesis.

James Campbell, B.S. in Ed., M.S. in Ed., Guidance and Personnel Administration, Educational Psychology, Human Relations in Industry. Thesis: An Analysis of Factors Related to the Scholastic Success of Freshmen Engineering Students at Cornell University.

Charles Wendell Carlson, B.S., M.S. in Agr., Animal Nutrition, Animal Physiology, Biochemistry. Thesis: Further Studies on Unidentified Factors Required in Chick Nutrition.

Jess Gale Carnes, A.B., A.M. (History), Modern European History, English History, Political Theory. Thesis: The French Army Officers and the Establishment of the Republic, 1876–1889.

Shao-Lin Chen, B.S., Plant Physiology, Biochemistry, Cytology. Thesis: Use of Radioactive Phosphorus and Carbon for Transport Studies in Plants.

Tseng Tung Cheng, B.S., M.S., Applied Mathematics, Algebra, Mathematical Analysis. Thesis: On the Sum of Independent Random Variables.

William LaMar Coggshall, B.S., Apiculture, Economic Entomology, Insect Morphology. Thesis: Beeswax.

Robert Fairchild Cushman, A.B., A.M., Constitutional Law, American Government and Institutions, Comparative European Government. Thesis: Public Support of Religious Education in American Constitutional Law.

Richard Malone Davis, A.B., A.M., Economic Theory and Its History, Money, Banking and International Finance, Labor and Industrial Relations. Thesis: The Theory of Profit in Recent Economic Thought.

Robert Bowman Deering, B.S. (Horti.), M.S., Floriculture and Ornamental Horticulture, Extension Teaching, Painting and Sculpture. Thesis: Organic Planning in Landscape Design.

James Reginald DeHaan, B.S., Physical Chemistry, Physics, Organic Chemistry. Thesis: The Kinetics of Solution of Cellulose Acetate and Cellulose Nitrate.

Todor Manoloff Dobrovsky, B.S. (Agr.), M.S., Apiculture, Insect Morphology and Histology, Economic Entomology. Thesis: The Postembryonic Changes in the Digestive Tract of the Worker Honeybee (*Apis mellifera* L.).

Rosalind Falk Dymond, B.A., M.A., Social Psychology, Applied Psychology, Sociology. Thesis: Empathic Ability: An Exploratory Study.

Stephen Woodman Eaton, A.B., M.S., Ornithology, Mammalogy, Botany. Thesis: The Genus Seiurus: A Comparative Study of the Species.

Ernest Preston Edwards, B.A., A.M., Ornithology, Vertebrate Zoology, Botany. Thesis: Birds of the Patzcuaro Lake Basin.

Robert Lindsay Egbert, B.S., M.S., Educational Psychology, Guidance and Personnel Administration, Family Relations. Thesis: The Effect of Some Childhood and Adolescent Experiences on the Emergence of Values.

Franklin Paul Eggert, B.S., M.S. in Agr., Pomology, Plant Physiology, Soils. Thesis: Studies on Rest Period in Hardy Fruit Species and on the Influence of Certain Substances and of Internal Conditions on Rest and Dormancy in the Apple.

Tom William Embleton, B.S. in Agr., Pomology, Soils, Plant Physiology. Thesis: Soil Acidification Studies in New York Apple Orchards as Influenced by Spray Materials.

Howard Ensign Evans, B.S., M.S., Insect Taxonomy, Economic Entomology,

Vertebrate Zoology. Thesis: A Taxonomic Study of the Nearctic Spider Wasps Belonging to the Tribe Pompilini (Hymenoptera, Pompilidae).

Louis Lloyd Ferstandig, B.S. (Chem.), Organic Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: Studies of Isocyanic Acid and Allophanates.

Kathleen Elizabeth Fetherston, B.A., M.S., Ornithology, Vertebrate Zoology, Nature Study. Thesis: A Study of the Ring-necked Pheasant on Pelee Island, Ontario.

Elwood George Fisher, B.S., Pomology, Plant Physiology, Biochemistry. Thesis: Nitrogen Fertilization of the McIntosh Apple with Leaf Sprays of Urea.

Dean Foster, A.B., Experimental Psychology, Applied Psychology, Organic Chemistry. Thesis: A Quantitative and Qualitative Analysis of Odors.

George Kessler Fraenkel, A.B., Physical Chemistry, Physics, Mathematics. Thesis: The Viscosity and Shear Elasticity of Solutions of Simple Deformable Particles.

John Parks Fraser, B.S. in Chem. Eng., B.Chem.E., Metallurgy, Chemical Engineering, Heat-Power Engineering. Thesis: The Behavior of Foundry Sands at Elevated Temperatures.

Marshall Reid Godwin, B.S. in Agr., M.S. in Agr., Marketing, Prices and Statistics, Farm Management. Thesis: Some Economic Aspects of Consumer Packaging as a Method of Retailing Fruits and Vegetables.

Carlos Tirzo Gonzenbach-Freire, Ingeniero Agronomo, M.S. in Agr., Plant Pathology, Plant Breeding, Plant Morphology (including Anatomy). Thesis: A Biologic Method for Testing Chemicals for the Control of the Potato Ring Rot Pathogen, *Corynebacterium sepedonicum* (Spieck. and Kotth.) Skapt. and Burkh.

Donald Flemming Gordon, B.A., M.A., Economic Theory and Its History, Philosophy, Money, Banking and International Finance. Thesis: Some Aspects of the Pure Theory of Employment, Distribution and Equilibrium.

Robb Shelton Gowe, B.S.A., M.S., Animal Genetics, Animal Physiology, Endocrinology. Thesis: Studies of the Physiological Basis for a Genetic Type of Infertility in the Domestic Fowl.

James Martin Gwin, B.S., M.A., Marketing, Business Management, Poultry Husbandry. Thesis: An Economic and Historical Study of Food Procurement for the Armed Forces of the United States.

Richard Martin Hagen, B.Ch.E., Physical Chemistry, Mathematics, Physics. Thesis: A Study of Detergent Solutions by Light Scattering.

James Winford Hall, A.B., M.A., English Literature since 1700, Prose Fiction, English Poetry. Thesis: Arnold Bennett: The Mediation between Primitivism and Taste.

Norman Brierley Hall, Jr., B.S., M.S., Applied Psychology, Experimental Psychology, Industrial Engineering. Thesis: Changes in Elemental Motions of a Repetitive Factory Operation as Related to the Hour of the Day.

Raymond James Hock, B.S., M.S., Comparative Physiology, Ornithology, Vertebrate Zoology. Thesis: Temperature and Bat Metabolism.

Margaret Lillian Hockin, B.Sc., M.S., Child Development and Family Relations, Sociology and Anthropology, Education. Thesis: A Study of the Process of Acculturation as Revealed in Canadian Japanese Family Life.

Arland Tillotson Hotchkiss, B.S. in Ed., M.S., Economic Botany, Nature Study, Genetics. Thesis: Studies in the Algae of Bergen Swamp, New York.

Warren Jacob Houck, Jr., B.S. in C.E., Nature Study, Economic Botany, Verte-

brate Zoology. Thesis: A Study of Conservation Education on the Wildlife Refuges of the United States. A Report and Recommendations.

John Iwanik, B.A., A.M., Spanish Literature, Russian Language and Literature, French Literature of the Eighteenth Century. Thesis: A Study of the Abnormal Characters in the Novels of Benito Perez Galdos.

Chase Del Mar Kearl, B.S., M.S. in Agr., Farm Management, Prices and Statistics, Economic Theory and Its History. Thesis: An Economic Analysis of New York Production of Eggs.

John Franklin Kent, A.B., Histology and Embryology, Comparative Anatomy, Animal Physiology. Thesis: The Origin, Fate, and Cytochemistry of the Globule Leucocyte.

Jimmie Wray Killian, B.E.E., Physics, Mathematics, Electrical Engineering. Thesis: Rotation and Acceleration in Kinematic Relativity.

Anne Ruth King, A.B., A.M., English Literature to 1700, Medieval Literature, Latin Literature. Thesis: Translation from the Classics during the Restoration with Special Reference to Dryden's *Aeneis*.

John Edward Klinker, B.S. in Agr., Vegetable Crops, Plant Physiology, Biochemistry. Thesis: A Study of the Field Performance and Physiological Characteristics of Several Tomato Varieties.

Gerald William Lattin, B.S., M.S. in Ed., Guidance and Personnel Administration, Psychology, Sociology. Thesis: Factors Associated with Success in Hotel Administration.

George Laush, B.S. in Chem., Mathematical Analysis, Geometry, Physics. Thesis: Relations among the Weierstrass Methods of Summability.

Jesse Lunin, B.S., M.S., Soils, Plant Physiology, Inorganic Chemistry. Thesis: Some Factors Affecting the Solubility of Aluminum, Iron, and Manganese in Soils and Clays.

Joseph MacCoy, A.B., Supervision, Educational Administration, Rural Sociology. Thesis: The Relationship of In-Service Training of Teachers on School Evaluation as It Affects Three Union Free Schools and Three Centralized Schools of New York State.

Leo Mandelkern, A.B., Physical Chemistry, Physics, Mathematics. Thesis: A Kinetic and Equilibrium Study of the Interaction of Vapors with Cellulose Acetate.

George Emiel Mattus, B.S., Pomology, Plant Physiology, Biochemistry. Thesis: Physiology of Pears as Affected by Composition of the Atmosphere.

David Allen McConnaughey, A.B., A.M., American Literature, American History, Philosophy. Thesis: Nationalism and American Letters, 1865–1900.

Morton Edwin Milberg, B.S.(Chem.), Physical Chemistry, Inorganic Chemistry, Physics. Thesis: I. An Investigation of the Structure of Dimethyl Amine-Boron Trifluoride, $(Ch_3)_2HN.BF_3$; II. Notes on the Structure of Di-Phosphorus Oxychloride-Stannic Chloride, $SnCl_4.2POCl_3$.

Franklin Kingston Moore, B.S. in M.E., Aeronautical Engineering, Mechanics, Mathematics. Thesis: Second Approximation to Supersonic Conical Flows.

Spencer Horton Morrison, B.S., M.S., Animal Husbandry, Animal Nutrition, Animal Physiology. Thesis: The Effect of Methods of Curing upon the Nutritive Value of Hay.

Erskine Vance Morse, D.V.M., M.S., Veterinary Bacteriology, Veterinary Physiology, Biochemistry. Thesis: The Cultural and Biochemical Characteristics of

Some Diphtheroid Bacilli of Animal Origin with an Ecological Study of *Corynebacterium renale.*

Bruce Carlton Netschert, A.B., International Economics, Economic Geology, Geography. Thesis: The Mineral Foreign Trade of the United States in the Twentieth Century: A Study in Mineral Economics.

Victor Fleetwood Nettles, B.S. in Agr., M.S. in Agr., Vegetable Crops, Plant Physiology, Soils. Thesis: A Study of Physical Methods for Determining the Stage of Maturity of Tomato Fruits.

Joseph Henry North, A.B., A.M., Dramatic Production, Dramatic Literature, Theatre Techniques. Thesis: The Early Development of the Motion Picture, 1887–1909.

Louise Tips Paine, B.S.Ed., M.S., Guidance and Personnel Administration, Educational Psychology, Rural Sociology. Thesis: A Survey of Current Personnel Practices in Selected Colleges and Universities as Related to the Functions of the Office of the Dean of Women.

Weymouth D. Pew, B.S., Vegetable Crops, Plant Physiology, Plant Breeding. Thesis: Effects of the Sodium and Chlorine Ions on the Growth and Yield of Table Beets *(Beta vulgaris).*

Harry Hubert Pierce, A.B., M.A., American History, English History, International Law and Relations. Thesis: Public Aid to Railroads in New York.

Robert Eldon Pingry, A.B. in Ed., M.A. in Ed., Secondary Education, Supervision, Mathematics. Thesis: A Study of the Relationships between Students' Marks in the Combined Course in Analytic Geometry and Calculus at Cornell University and Certain Aspects of the Students' Secondary School Training.

Sherman Kennedy Reed, B.S., Organic Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: The Preparation and Properties of Some Chlorofluorodienes.

John Pearson Roche, A.B., A.M., American Governmental Institutions, Comparative Government, American Government and Institutions. Thesis: Loss of American Nationality.

Helen Beaumont Ross, B.A., A.M., Nature Study, Botany, Entomology. Thesis: A Study of Conservation Education in the Elementary Schools of the United States.

Charles William Rutschky, III, B.S., Economic Entomology, Insect Embryology, Pomology. Thesis: Embryology of the Oriental Fruit Moth, *Grapholitha molesta* (Busck).

Albert Duncan Scott, B.S.A., Soils, Plant Physiology, Physical Chemistry. Thesis: The Application of the Donnan Equilibrium to the Determination of Cation Activities and Cation Interactions in Clay Suspensions.

Arlene Rebecca Seaman, B.S. in Ed., M.S., Histology and Embryology, Anatomy, Neurology. Thesis: The Histology of the Oviduct of the Common Garter Snake, *Thamnophis ordinatus ordinatus,* throughout the Reproductive Cycle.

Punyamay Sen, B.Sc., M.Sc., Vegetable Crops, Soils, Plant Physiology. Thesis: Studies on the Causes of Deterioration with Age of Cucumber and Muskmelon Seeds.

William Franklin Shipe, Jr., B.S., Dairy Science, Bacteriology, Organic Chemistry. Thesis: A Study of the Relative Specificity of Lipases Produced by *Penicillium roqueforti* and *Aspergillus niger.*

William Livingston Spalding, Jr., A.B., A.M., A.M., Modern European History, Medieval History, History of Eastern Europe. Thesis: Social Imperialism: The

Impact of Nationalism on German Socialist Thinking during the First World War, 1914–1918.

Robert Staples, B.S., Economic Entomology, Insect Toxicology, Plant Pathology. Thesis: Studies on the Green Peach Aphid, *Myzus persicae* Sulzer.

Robert Folger Thorne, A.B., M.S., Economic Botany, Plant Morphology, Geography and Geomorphology. Thesis: The Flora of Southwestern Georgia.

Kwang-seng Wang, B.S., M.S., Land Economics and Agricultural Geography, Economic Theory, Statistics. Thesis: Quantitative Relationships between Farm Management Factors and Farming Returns for Use in the Economic Classification of Land.

Walter Weyler Waring, B.A., M.A., English Literature since 1700, English Poetry, The English Renaissance. Thesis: Thomas Carlyle as a Biographer.

Alma Taylor Watkins, B.S. in Ed., M.A., Spanish Literature, Romance Linguistics, French Literature. Thesis: Eroticism in the Novels of Felipe Trigo.

Ellis Hobart Whitaker, B.S. in M.E., M.S., Plant Physiology, Education, Vertebrate Zoology. Thesis: Physiological Studies of Two Species of *Drosera,* L.

George Milton Wing, A.B., M.S., Mathematical Analysis, Applied Mathematics, Physics. Thesis: The Mean Convergence of Orthogonal Series.

CONFERRED FEBRUARY 1, 1950

Ben Allen, A.B., Inorganic Chemistry, Analytical Chemistry, Organic Chemistry. Thesis: A Study of Methylgermanium Trichloride and Monomethylgermanium Oxide.

Keith Phillips Anderson, A.B., Physical Chemistry, Physics, Mathematics. Thesis: The Molar Heats of Solution of Boric Oxide and Boric Acid.

Charles Archie Newman Baker, B.Sc., M.Sc., Chemical Engineering, Physical Chemistry, Inorganic Chemistry. Thesis: Flow Properties of Non-Newtonian Fluids.

Warren Sandusky Barham, B.S.A., Plant Breeding, Vegetable Crops, Plant Physiology. Thesis: A Study of Some Problems Related to Hybrid Onion Production, with Special Emphasis on the Study of Male Sterility.

Bernard Villars Baus, B.Chem.Eng., Chemical Engineering, Physical Chemistry, Mathematics. Thesis: Heat-Transfer Coefficients for Condensing Vapors.

Carl William Boothroyd, A.B., M.S. in Agr., Plant Pathology, Mycology, Plant Physiology. Thesis: Stem Streak and Die-Back of Muskmelon.

Margaret Carrigan, A.B., M.A. (Ed.), English Literature since 1700, Elizabethan Literature, American Literature. Thesis: Mid-Victorian Criticism as Revealed in the Criticism of Tennyson, 1850–1870.

Amoss Lee Coleman, A.B., A.M., Rural Sociology, Sociology, Cultural Anthropology. Thesis: The People's View of the Extension Service in Relation to Extension Objectives and Problems.

Robert Perrigo Conger, A.B., Organic Chemistry, Biochemistry, Inorganic Chemistry. Thesis: I. Synthetic Studies of dl-Muscone and Dihydrocivetone; II. The Synthesis of Certain Octalins.

Radha Charan Das, B.S., M.S. in Ed., Industrial Education, Educational Administration, Guidance and Personnel Administration. Thesis: An Analytical Study of Electrical Curricula in Selected Technical Institutes of Northeastern United States.

Frances Beverly Dunkle, B.A., Physical Chemistry, Mathematics, Physics. Thesis: An Investigation of the Acid Catalyzed Hydrolysis of Gamma-Butyrolactone.

Felician Francis Foltman, B.S. in Ed., M.S. in Ed., Industrial Education, Human Relations in Industry, Personnel Management. Thesis: Factors Bearing on Supervisory Morale—An Analysis of a Training Program, the Philosophy of Management, and Certain Personnel Practices. A Case Study.

Vincent Freimarck, A.B., A.M., English Literature, American Literature, French Literature. Thesis: The Bible in Eighteenth-Century English Criticism.

Maximiliano Jose Gurdian, B.S., M.S., Dairy Industry, Biochemistry, Field Crop Production. Thesis: A Study of American Cheddar Cheese Ripened at High Temperatures.

Norman Hervey High, B.S.A., M.S., Rural Education, Rural Sociology, Agricultural Economics. Thesis: A Study of Educational Opportunity in the Provincially-Controlled Schools of Haldimand County, Ontario.

Paul Van Campen Hough, B.A., Experimental Physics, Theoretical Physics, Mathematics. Thesis: On the Photodisintegration of the Deuteron by Lithium and Fluorine Gamma-Rays.

Liang Huang, B.S. in Chem., Organic Chemistry, Inorganic Chemistry, Physical Chemistry. Thesis: Aldoketene Dimers. Studies Pertaining to the Mechanism of Their Formation from Acid Chlorides.

Ghulam Hussain Allah Obahio Khan Jafferi, B.A., B.T., M.A., Educational Administration, Rural Sociology, Child Development and Family Relations. Thesis: A Suggestive Plan for Operating the Rural Schools in Sind (Pakistan) as Community Schools.

Eric Wyyn Jones, Vet. Surgeon, Veterinary Surgery, Animal Pathology, Small Animal Diseases. Thesis: A Review of and Observations upon General Anaesthetics Used in the Horse.

Edmund Leonard Jossem, B.S., M.S., Experimental Physics, Theoretical Physics, Physical Chemistry. Thesis: The X-Ray K Spectra of Potassium and Chlorine in Potassium Chloride.

Haruyuki Kamemoto, B.S., M.S., Floriculture and Ornamental Horticulture, Plant Breeding, Cytology. Thesis: The Cytology of Orchids with Particular Reference to the Cattleya Group (Laeliae).

Israel Kaplan, A.B., M.A., American Literature, Nineteenth-Century Literature, English Literature after 1700. Thesis: Rudyard Kipling's "From Sea to Sea."

Robert Lambert, B.S., M.S., Insect Taxonomy, Economic Entomology, Forest Conservation. Thesis: Revision of the Moths of the Subfamily Sparganothidinae (Lepidoptera, Tortricidae).

Peter Richard Lantos, B.S. in Chem. Eng., B.Chem.Eng., Chemical Engineering, Organic Chemistry, Physical Chemistry. Thesis: Improved Yields of Para Dichlorobenzene: The Substitutive Chlorination of Benzene.

Crawford Bernard Lindsay, A.B., A.M., American Literature, The Restoration and the Eighteenth Century, Dramatic Literature. Thesis: The Cornell University Special Collection on Slavery: American Publications through 1840.

Miguel A. Lugo-Lopez, B.S. in Agr., M.S., Soils, Farm Management, Field Crops. Thesis: The Moisture Relationships of Puerto Rican Soils.

Charles Robertson Mangam, B.A., M.A., American Literature, Victorian Literature, Eighteenth-Century Literature. Thesis: A Critical Biography of Thomas Bailey Aldrich.

Thurston Jefferson Mann, B.S. (Agr.Ed.), M.S., Plant Breeding, Field Crop Production, Plant Physiology. Thesis: Locating Genetic Factors for Kernel-Row Number in the Chromosomes of Maize by Use of Translocations.

Harold Claude Mattraw, B.S. in Chem., Inorganic Chemistry, Analytical Chemistry, Organic Chemistry. Thesis: A Study of n–Butyl Boronic Acid and Tri–n–Butyl Boronic Oxide.

Alexander Scott McKay, B.A., M.A., Experimental Physics, Theoretical Physics, Mathematics. Thesis: A Cloud Chamber Study of Extensive Air Showers at 3260 Meters Elevation.

Fred Warren McLafferty, B.Sc., M.Sc., Organic Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: The Preparation and Properties of 2,3–Dichlorotetrafluoro–1, 3–Butadiene.

Max Myers, B.S., M.S. in Agr., Farm Management, Rural Sociology, Marketing. Thesis: Farm Tenure Processes in South Dakota.

Irene Dorothy Neu, B.A., A.M., American History, English History, Economic History. Thesis: A Business Biography of Erastus Corning.

Grant Jackson Northrup, B.A., A.M., Guidance and Personnel Administration, Educational Psychology, American History. Thesis: The Duties, Qualifications, and Professional Problems of Shared Counselors in New York State.

Edgar Allen Parsons, B.S. (Bus. Admin.), Collective Bargaining, Mediation, and Arbitration, Personnel Management, Economic History. Thesis: Some Economic Aspects of Collective Bargaining in the Rubber Industry.

Sarojini Suryajee Pawar, B.S., M.S., Vegetable Crops, Plant Breeding, Plant Physiology. Thesis: The Effect of Environmental and Other Factors on Reproductive Growth in Celery (*Apium graveolens* L.).

John William Holman Rehn, B.S., Insect Taxonomy, Vertebrate Zoology, Parasitology. Thesis: The Wings of the Blattaria (Orthoptera).

Samuel S. Ristich, B.S. in Ed., Entomology, Insect Ecology, Economic Botany. Thesis: Biology of the Seed-Corn Maggot, *Hylemya cilicrura* (Rondani) and Preliminary Studies on Its Control.

Hsien-gieh Sie, B.S., M.S., Biochemistry, Organic Chemistry, Animal Nutrition. Thesis: Studies on Lysine in Protein-containing Feed Stuffs (Including a Study of the Determination of Tyrosine): 1. Determination of Lysine; 2. Influence of Hydrolytic Procedures on the Liberation of Lysine; 3. The Effect of Heat on Lysine.

Hao Sung Tan, B.Sc., Aeronautical Engineering, Mechanics, Applied Mathematics. Thesis: The Wave Drag of a Supersonic Biplane of Finite Span.

Charles Beard Tennant, B.S., Inorganic Chemistry, Physical Chemistry, Chemical Microscopy. Thesis: An Investigation of Interaction of Boric Oxide with Iron Oxides.

Herman Leon Wagner, B.S., M.S., Physical Chemistry, Physics, Mathematics. Thesis: The Properties of the Amphoteric Copolymer 2–Vinyl Pyridine–Acrylic Acid and Its Methyl Ester.

George Warfield, B.S., Experimental Physics, Theoretical Physics, Mathematics. Thesis: A Study of Electron Bombardment Induced Conductivity in Silver Chloride Single Crystals.

Anna Margaret Weber, A.B., A.M., History of Philosophy, Aesthetics, Prose Fiction. Thesis: Is Value Attributive or Psychological? A Study of Three Realists.

Odin Wilhelmy, Jr., B.A., Land Economics and Agricultural Geography, Marketing, Animal Nutrition. Thesis: A Survey of the Social and Economic Status of Families in Groton Township, Tompkins County, New York, and Its Relationship to Certain Aspects of Their Food Habits.

Alfrédie Flora Maria Wouters, Licencie en Philosophie et Lettres, B.L., Ameri-

can Literature, Dramatic Literature, Sociology. Thesis: America in Literature, 1920–1940.

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Phillip Adams, B.S., Organic Chemistry, Inorganic Chemistry, Physical Chemistry. Thesis: I. Preparation and Properties of O–Ethyl–S–(Arylazo)–Xanthates; II. An Attempt to Prepare Certain Derivatives of Cyclobutane.

Richard H. Allaway, A.B., A.M., Labor Union History, Organization and Operation, Labor Market Economics and Analysis, Human Relations in Industry. Thesis: Four Analytical Approaches toward an Understanding of the Decision-Making Process in Three Retail Unions.

Dorothy Ruth Baisch, B.A., B.L.S., A.M., The Nineteenth Century and After, American Literature, Dramatic Literature. Thesis: London Literary Circles, 1910–1920, with Special Reference to Ford Madox Ford, Ezra Pound, D. H. Lawrence, and Virginia Woolf.

Glenn Hans Beck, B.S. (Agr.), M.S., Animal Husbandry, Animal Physiology, Animal Nutrition. Thesis: Variations in the Response of Dairy Cows to Mechanical Milking.

John Walter Bicknell, B.S., A.M., The Nineteenth Century and After, English Poetry, American Literature. Thesis: Leslie Stephen as an Intellectual Historian.

John William Bratzler, B.S. in Agr., M.S., Animal Nutrition, Biochemistry, Animal Physiology. Thesis: Vitamin E Metabolism in Swine and the Use of Molecular Distillation in the Determination of Tocopherols.

Judith Bregman, B.A., Physical Chemistry, Mathematics, Physics, Thesis: The Sector Technique in Electron Diffraction: The Structures of Beta-Propiolactone, Diketene and Methylketene Dimer.

James Balfour Buchanan, B.A., M.A., Organic Chemistry, Biochemistry, Inorganic Chemistry. Thesis: Studies Relating to the Structure of Gliotoxin.

Russell Clarke Butler, B.S. in Agr., M.S., Agricultural Education, Guidance and Personnel Administration, Rural Sociology. Thesis: Some Factors Influencing the Choice of Vocational Agriculture Teaching.

Donald Alston Clarke, B.S. in Pharmacy, A.M., Pharmacology, Physiology, Biochemistry. Thesis: Monofluoracetic Acid: Effects of the Compound on Metabolic Processes.

Solomon Cook, B.S., M.S. in Agr., Vegetable Crops, Agricultural Engineering, Economic Botany. Thesis: The Combination of Cultivation, Flame, and Chemicals to Control Weeds in Potatoes.

John Thomas Cope, Jr., B.S. in Agr., M.S. in Agr., Soils, Inorganic Chemistry, Field Crop Production. Thesis: The Effect of Sodium Fertilization on Yield and Cation Content of Certain Field Crops.

Alexander Cochran Davis, B.S.A., Economic Entomology, Insect Toxicology, Vegetable Crops. Thesis: The Use of Soil Insecticides for the Control of Wireworms.

Donald Henry Dewey, B.S., Vegetable Crops, Plant Physiology, Pomology. Thesis: Air Blast and Vacuum Cooling of Vegetables and Fruits.

Subhas Kumar Dhar, B.A., M.A., Land Economics, Farm Management, Prices and Statistics. Thesis: Grain Sorghum and Millet: An Estimate of World Production, Utilization, and Trade, and an Examination of the Possibilities of Their Expansion.

Wendell George Earle, B.S. (Agr.), M.S. in Agr., Marketing, Farm-Management, Personnel Management. Thesis: Marketing Eggs through Wholesale Channels.

Donald Preston Eckman, B.S.E. (M.E.), M.S., Experimental Mechanical Engineering, Industrial Engineering, Heat Power Engineering. Thesis: The First Product Moment Criterion for Performance of Automatic Control Systems.

Joanne Elliott, B.A., A.M., Mathematical Analysis, Applied Mathematics, Algebra. Thesis: On Some Singular Integral Equations of the Cauchy Type.

Ernest Slavko Elyash, B.S. in Chem., Applied Mathematics, Mathematical Analysis, Physical Chemistry. Thesis: Several Limiting Laws of the Kolmogorov-Smirnov Type.

Arnold Harold Fainberg, A.B., Organic Chemistry, Physical Chemistry, Chemical Microscopy. Thesis: Substitution Reactions of Highly Fluorinated Alkyl Chlorides and Bromides.

Katherine Martha Fischer, B.A., M.A., Medieval History, American History, Modern European History. Thesis: A Study of the Lombard Laws.

George Anderson Foote, A.B., M.A., English History, Modern European History, History of Science. Thesis: A Study of Attitudes toward Science in Nineteenth-Century England 1800–1851.

Alexander Murdoch French, B.S., Plant Pathology, Plant Physiology, Plant Breeding. Thesis: Physiologic Differences among Physiologic Races of *Phytophthora infestans* (Mont.) DeBary.

John Ledel Gammel, Jr., B.S. in Physics, M.A., Theoretical Physics, Experimental Physics, Mathematics. Thesis: On the Elastic Scattering of Protons by Deutrons.

Guy John Goble, B.S., M.S., Insect Physiology, Insect Toxicology, Biochemistry. Thesis: The Effects of Agricultural Chemicals on Honey Bees. (Degree conferred as of September, 1949.)

Chesley Barker Hall, B.S., M.S., Vegetable Crops, Plant Breeding, Plant Physiology. Thesis: Studies on the Volatile Constituents of Peas and Asparagus.

Edward Hudson Hamilton, B.S., M.S. in Agr., Agricultural Education. Industrial Education, Supervision. Thesis: An Analysis and Interpretation of the Curricular and Extra-Curricular Activities of Former Agricultural Students of the New York State Agricultural and Technical Institute at Morrisville, in Terms of Objectives and Present Program of the Institute.

Richard Wilson Harris, B.S., M.S., Pomology, Soils, Plant Physiology. Thesis: Nitrogen Fertilization and Cultural Practice Studies in Elberta Peach Orchards.

Howard Lovelace Hassell, B. Chem. Eng., Physical Chemistry, Organic Chemistry, Inorganic Chemistry. Thesis: Phase Equilibria in the Ternary System Potassium Bromide, Bromine, and Water; also Boiling Point Relationships in the Ternary System Potassium Iodide, Iodine, and Water.

Wilfred Bostock Hathaway, B.S., M.S., Economic Entomology, Insect Toxicology, Floriculture and Ornamental Horticulture. Thesis: A Study of Factors Affecting the Performance of Greenhouse Aerosols of Para-Chlorophenyl Parachlorobenzenesulfonate in the Control of *Tetranychus bimaculatus* Harvey.

Oscar Hawksley, B.S., M.S., Ornithology, Nature Study, Wild Life Management. Thesis: A Study of the Behavior and Ecology of the Arctic Tern, *Sterna paradisaea* Brunnich.

Ellis Irving Hormats, B. Chem. E., M.S., Physical Chemistry, Chemical Engineering, Organic Chemistry. Thesis: Kenetics of the Brominations of Neopentane.

Earl Stewart Horner, B.S. in Agr., M.S., Plant Breeding, Plant Physiology, Plant Pathology. Thesis: Inter-type and Intra-type Corn Hybrids.

Donald Edwin Hudson, B. Physics, Experimental Physics, Theoretical Physics, Mathematics. Thesis: The Association of Bursts and Penetrating Showers. (Degree conferred as of February, 1950.)

Gordon Ellsworth Hunt, A.B., Plant Physiology, Biochemistry, Bacteriology. Thesis: A Comparative Chromatographic Study of the Amino-Nitrogen and the Pathway of Carbon–14, in the Roots and Nodules of Five Species of Legumes.

Robert Isaac Jackson, A.A., S.B., Plant Breeding, Plant Pathology, Field Crop Production. Thesis: A Study of the Reaction of Four Inbred Strains of Corn to *Ustilago zeae* (Beckm.) Unger.

Paul Fletcher Jamieson, A.B., A.M., The Nineteenth Century and After, English Poetry, Medieval Literature. Thesis: Poet and Audience in the Victorian Age.

George Andrew Johannessen, B.S. in Agr., M.S., Vegetable Crops, Plant Physiology, Plant Breeding. Thesis: Tomato Fruit Cracking Studies.

Bhawan Tarachand Karnani, B.Sc.(Agr.), M.Sc.(Agr.), Dairy Science, Biochemistry, Bacteriology. Thesis: The Effects of Vitamin C, Copper, NDGA Anti-Oxidant, and the Conditions of Storage on the Stability of Fat and Fat-soluble Vitamins in Frozen Cream Pasteurized at 71.1° C. and 76.6° C.

August Ernest Kehr, B.S., M.S., Plant Breeding, Plant Pathology, Cytology. Thesis: Cytogenetic Studies of Multiple Genome Relationships in Nicotiana.

Edward Haskell Kerner, A.B., Theoretical Physics, Experimental Physics, Mathematics. Thesis: The Solution of the Schrodinger Equation in an Approximate Atomic Field.

Satya Prakash Kohli, B.S. in Agr., M.S. in Agr., Plant Breeding, Cytology, Field Crop Production. Thesis: A Study of the Variation among the Various Seed Increases of Two Synthetic Varieties of Alfalfa, Ranger and Eastern Synthetic.

Richard Paul Korf, B.S., Mycology, Genetics, Botany. Thesis: A Monograph of the Arachnopezizeae.

Nathan Edgar Kullman, Jr., A.B., M.A., Educational Administration, Rural Sociology, Economic Theory and Its History. Thesis: School Plant Facilities Desirable for Community Use in a Community-School Program.

Hariott Orren Kunkel, B.S. (Agr.), M.S., Biochemistry, Animal Physiology, Animal Nutrition. Thesis: Studies on Coupled Reactions in the Oxidation of Methyl Linoleate.

Robert Edwin Lee, B.S., Plant Breeding, Cytology, Floriculture. Thesis: A Cytogenetic Study of Extra Chromosomes in *Nicotiana langsdorffii* and in Crosses with *N. Sanderae*.

Benjamin Ferris Lownsbery, Jr., B.A., Plant Pathology, Plant Physiology, Biochemistry. Thesis: Larval Migration from Cysts of the Golden Nematode of Potatoes, *Heterodera rostochiensis* Wollenweber.

Vera Ellen Malton, A.B., A.M., Drama and the Theatre, Dramatic Literature, Speech and Phonetics. Thesis: Stage, Mise en Scène, and Audience.

Stanley Bert McCaleb, B.S., M.S. in Agr., Soils, Land Economics and Agricultural Geography, Mineralogy and Petrology. Thesis: Morphological, Physical, Chemical, and Mineralogical Studies of a Gray-Brown Podzolic–Brown Podzolic Soil Sequence of New York State.

Andrew Colin McClung, B.S., M.S., Soils, Pomology, Plant Physiology. Thesis:

Some Studies on the Behavior of Soil Boron under Cropping and on Certain Factors Which May Be Involved in the Appearance of Boron Deficiency Symptoms during Seasons of Low Rainfall.

William Edgar McQuistion, B.S., Organic Chemistry, Inorganic Chemistry, Physical Chemistry. Thesis: Studies of New Synthetic Methods for the Preparation of Dicarboxylic Acids: Section I. The "Oxo" Process; Section II. Miscellaneous Reactions.

Marion Watt Meadows, B.S., M.S., Vegetable Crops, Plant Breeding, Plant Physiology. Thesis: A Study of the Factors Affecting Vascular Discoloration of Potatoes.

Henry Denison Merwin, S.B., M.S., Soils, Field Crop Production, Organic Chemistry. Thesis: The Release of Non-Exchangeable Potassium into Exchangeable Form in Four New York Soils.

John Jasper Mikell, B.S., M.S., Vegetable Crops, Plant Breeding, Plant Physiology. Thesis: Studies of Flowering in Sweet Potatoes: A. Effect of Certain Factors on Flowering; B. Ontogeny of the Flower.

William Frederick Millier, II, B.S., Agricultural Engineering, Farm Equipment, Farm Management. Thesis: The Ventilation of Dairy Stables with Electric Fans.

George Walter Morgan, B. (M.Eng.), M.M.E., Fluid Mechanics, Mechanics, Mathematics. Thesis: A Study of Motions in a Rotating Liquid.

David Lockwood Olmsted, A.B., A.M., Slavic Linguistics, General Linguistics, Anthropolgy. Thesis: The Phonology of Polish.

Williams Carson Paddock, B.S. (Sci.), Plant Pathology, Plant Physiology, Plant Breeding. Thesis: A Histological Study of Suscept-Pathogen Relationships between *Helminthosporium victoriae* M. and M. and Seedling Oat Leaves.

Robert Marshall Pratt, B.S., Plant Pathology, Plant Physiology, Biochemistry. Thesis: Investigations of Fungicide Deposits and Fruit Tree Disease Control by the Spray-dust and Mist Spray Methods as Compared with Conventional Hydraulic Spraying.

Harold Arthur Quinn, B.Sc., M.Sc., Structural Geology, Economic Geology, Petrology. Thesis: Geology and Gold Deposits of the Gianque Lake Section, Yellowknife Area, Canada.

William Andrew Raney, B.S., M.S., Soils, Physical Chemistry, Plant Physiology. Thesis: Oxygen Diffusion as a Method of Characterizing Soil Aeration.

Richard Kenneth Redfern, B.S. (Journalism), A.M., Dramatic Literature, American Literature, Nineteenth-Century Literature. Thesis: A Study of Act-Structure in Drama.

Kathleen Rhodes, Teacher's Cert., M.S. in Ed., Home Economics Education, Sociology, Child Development and Family Relationships. Thesis: A Study of Teachers' Choices of Objectives and Methods for Teaching Adults in Homemaking.

Jack Wilcox Rollow, B.A., A.M., English Literature before 1700, Latin, Medieval History. Thesis: The Text of *Sire Degarré*.

Douglas Alexander Ross, B.S. in Agr., M.S., Insect Ecology, Plant Taxonomy, Insect Morphology. Thesis: The Maple Leaf Cutter, *Paraclemensia acerifoliella* Fitch (Incurvariidae, Lepidoptera).

Estelita Longuinhos Saldanha, B.S. in Ed., M.A., Experimental Psychology, History of Psychology, Logic and Epistemology. Thesis: Relational Learning in the Rat.

Tom Taketo Sasaki, A.B., Sociology, Cultural Anthropology, Human Relations in Industry. Thesis: Technological Change in a Navaho Indian Farming Community: A Study of Social and Psychological Processes.

George Seifert, A.B., A.M., Applied Mathematics, Mathematical Analysis, Physics. Thesis: Some Third Order Boundary Value Problems.

John Herrmann Semon, B.S., M.S. in Ed., Supervision, Curriculum, Science Education. Thesis: Binaural Recording and Playback — An Audio Aid for Teacher Preparation for Supervisory Practice.

Will Marion Simmons, B.S. in Agr., M.S. in Agr., Marketing, Farm Management, Economic Theory. Thesis: An Economic Analysis of Consumer Meat Purchases in Syracuse, New York in 1948, and Comparison with 1942.

Charles Sloca, B.S. in Ed., A.M., Dramatic Literature, American Literature, Speech and Rhetoric. Thesis: The Dramatic Conflict.

Haruo Tashiro, B.S., M.S., Economic Entomology, Insect Toxicology, Field Crop Production. Thesis: The Biology and Attempted Control of Tabanidae in New York.

Richard Wilton Taylor, Physical Chemistry, Theoretical Physics, Inorganic Chemistry. Thesis: Phase Equilibria in the System Potassium Bromide-Bromine-Water and Some Exploratory Data on the System Ammonium Bromide-Bromine-Water.

Ichiro Tsuji, A.B., M. Nut. Sc., Biochemistry, Veterinary Physiology, Organic Chemistry. Thesis: Phospholipid and Cholesterol Changes in the Hen's Egg during Incubation.

Winfield Warren Tyler, A.B., Experimental Physics, Theoretical Physics, Mathematics. Thesis: Optical Absorption and Photoconductivity in Barium Oxide.

Masami Uota, B.S. in Agr., M.S., Pomology, Plant Physiology, Organic Chemistry. Thesis: Studies on Anthocyanin Development in McIntosh Apples.

Paul John Van Demark, B.S. in Agr., M.S., Bacteriology, Biochemistry, Organic Chemistry. Thesis: The Vitamin Requirements for Glycerol Oxidation by *Streptococcus faecalis*.

Harold Dean Wallace, B.S. (Agr.), M.S., Animal Nutrition, Animal Physiology, Animal Husbandry. Thesis: Milk Substitutes for Dairy Calves.

Randolph Townsend Wedding, B.S. (Agr.), M.S., Plant Physiology, Biochemistry, Vegetable Crops. Thesis: The Effect of 2,4–Dichlorophenoxyacetic Acid and Indoleacetic Acid on the Translocation of Solutes in Plants.

Harold Hughes Wood, B.S., M.S. in Ed., Secondary Education, Social Studies Education, Sociology. Thesis: William James and Modern Public Education.

Thomas Lenoir York, B.S., M.S., Plant Breeding, Vegetable Crops, Cytology. Thesis: Studies on Anthracnose Resistance in Beans.

Wasley Donald Yushok, B.S. in Agr., M.S., Chemical Embryology, Biochemistry, Biophysics. Thesis: The Relationships of Thyroid Activity to the Growth and the Cytochrome c Content of Chick Embryos and Their Organs.

MEMBERS OF THE STAFF

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